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Batter UP

America's
National
Pastime Goes **High-Tech**
PAGE 38

ALSO INSIDE

Can ERP Play Well
With Others?

PAGE 56

Storage Hits
The Network

PAGE 70

Bill Bolt, VP of IS for the Arizona Diamondbacks, credits technology with drawing the third largest crowds in the major leagues despite a losing season

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AND MORE ADVANTAGES
TO BEING DIRECT.
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Features

38 A Whole New Ballgame (Sort of)

COVER STORY: INDUSTRY CHANGE It's Opening Day and the grand old game is being dragged into the Information Age, not always willingly. But IT is surely changing baseball from a game of intuition and heart into one of research and analysis.

By Christopher Koch

48 Playing By the Rules

I.T./BUSINESS ALIGNMENT By rescuing the procedures that govern your business from the dark recesses of code, the disconnect between IT and business could finally be healed.

By Alan S. Kay

56 The Ties That Bolt

ENTERPRISE RESOURCE PLANNING There's no escaping it. You need bolt-ons so that your ERP software can share data with legacy and other systems. Here are four strategies for making integration work.

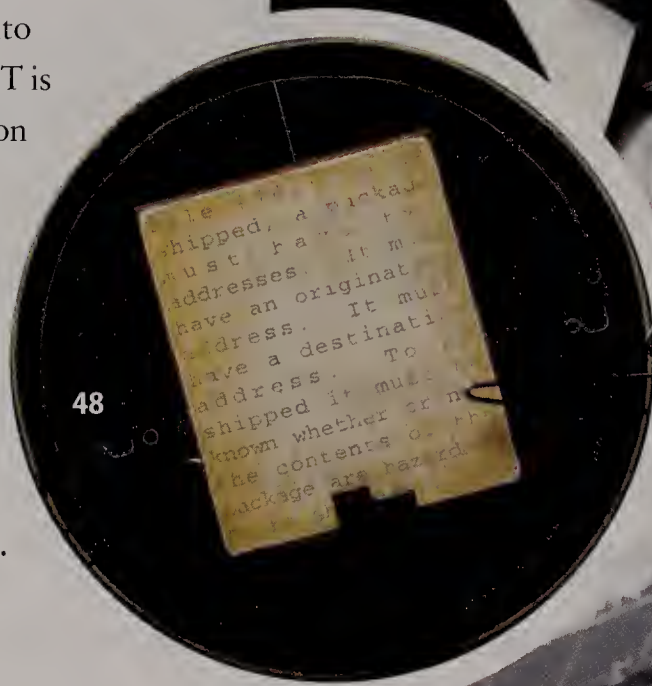
By Derek Slater



ON THE COVER

Bill Bolt uses IT
to hit a home run in
marketing.

Cover photo by Robert Burroughs





Unlike a

“

SQL Server takes a big step toward enterprise capability and introduces dramatic ease-of-use improvements with version 7.0 of the database server.” –PC Week¹

“New features extend SQL Server’s performance and scalability...most of the changes will move SQL Server from the role of department server **into the role of enterprise database server.**” –Windows NT²

“SQL Server 7.0 boasts impressive features

that administrators and users will both appreciate.” –InfoWorld³

“SQL Server 7.0 provides the flexibility, relational power, and continued ease of use that should put the product in the corporate winner’s circle.” –Intelligent Enterprise⁴

“We recommend that you consider SQL Server 7.0 for new data warehousing projects ranging from departmental and line-of-business

data warehousing even to the enterprise,

especially if you’re already a [Windows] NT shop.” –Mitch Kramer, Patricia Seybold Group

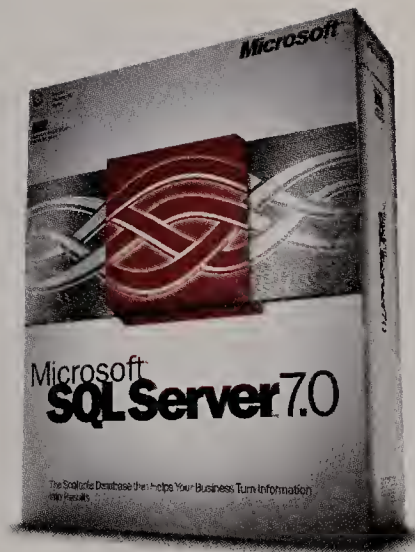
PC Week Best of Show, COMDEX/Fall 1998

**Database and Server Software
1998 Product of the Year** –InfoWorld⁵

”

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EXECUTIVE COUNSEL Sure the new generation of workers is different. That's why they're good for business. *By Mindy Blodgett*

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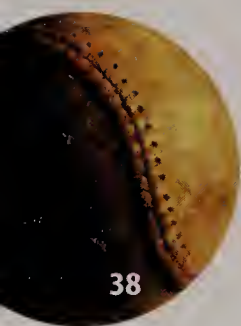
GIGA VIEW The future under your fingertips. *By Rob Enderle*

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EMERGING TECHNOLOGY Faster speeds are no surprise in storage, but this new technology eases data management too. *By John Webster*
Mobile backup • PC call screening • Automated delivery • Data conversion • Flexible contacts

80 Airborne Freight's Call Center Management System

WORKING SMART Workforce management software calculates staffing requirements and employee availability to create work schedules within seconds. *By Louise Fickel*



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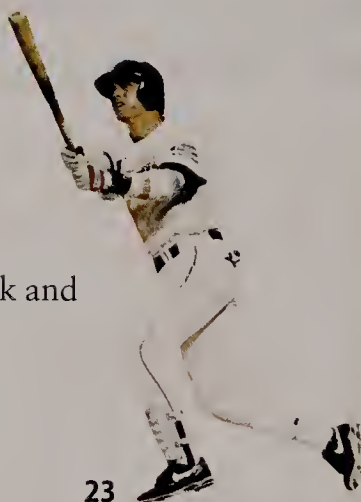
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Baseball by the Numbers • Signs and Portents • More and More Happy Returns • In Search of Form 8863 • A Home Page for a People Without a Home • Follow the Leader • Dial S for Scam

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Inside Section 2

COVER STORY: MERGERS & ACQUISITIONS

To stitch businesses together for profit, IT resources must be valued correctly.

TECHNOLOGY EDUCATION Hold your own in a blizzard of buzzwords! Simulate a depth of knowledge that others can only pretend to possess!

LEADING CHANGE A determined leader and a few crazy years remake the money-maker.

THE NEW WORKSPACE While CFOs cheer potential ROI from alternative office schemes, displaced cube dwellers may be less sanguine. Here's how to reconcile them to the new workplace order.

CHECKS & BALANCES Are your IT investment discussions based on the right information?

INTELLECTUAL CAPITALISM Using in-house consultants helps you retain all the intellectual capital a project generates. But beware: Many of these projects fail.

LEARNING CURVE Virtual desserts.



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In Box

LETTER FROM THE EDITOR, READER FEEDBACK
AND HOW TO REACH US

There's a move afoot to limit your legal rights.

The U.S. Congress is considering legislation that would limit liability for failures related to Y2K. I do not support this legislation, and neither should you.

Many organizations—especially the larger ones with the most complex problems—have spent millions of dollars and thousands of person hours fixing their systems. Legislation to limit liability won't protect those of you who have done the right thing. Rather, it would protect those who have ignored Y2K. In some cases, these may be companies on which you depend for critical goods or services.

If a company commits to provide goods or services, it is responsible for doing so regardless of whether its employees strike, its trains get lost or its systems fail because of Y2K. The courts are well equipped to address such failures, and there is nothing inherently different about Y2K.

There will be plenty of cases in which a judge or jury decides there were extenuating circumstances—that a failure occurred

despite a company's best efforts to fix its problems. That's what judges and juries are for. Let the legal system do its job and decide which cases have merit and which don't.

In early March, I testified before Congress on these issues at a joint hearing of the House subcommittees on Technology and on Government Management, Information and Technology. The members of these committees clearly want to do the right thing. (For more on this hearing, or to view a copy of the proposed bill, go to www.cio.com/forums/y2k/030999_testimony.html.)

And there *are* things the government can and should do to help. I think the government—and concerned businesses—should

- Focus on fixing Y2K problems and minimizing the impact of failures.
- Marshal available resources to help small businesses and nonprofits. This help includes awareness building, sharing of best practices, provision of financial and technical resources to fix the problem and so on.
- Continue to encourage information sharing among trading partners about their compliance efforts.
- Encourage mitigation and mediation before litigation.
- Protect consumers and businesses by holding companies responsible for not fixing their Y2K problems.

I'm certainly not suggesting that anyone's first impulse should be to run to the courts. We must continue to focus on fixing the problem. But it would simply be wrong for the government to change the law and deny people access to legal recourse just because the scope of this problem seems daunting.

What do you think? Send your opinions to me or to letters@cio.com.

Abbie Lundberg

Abbie Lundberg
lundberg@cio.com



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In Box

IF YOU BUILD IT

Christopher Koch's article, "The Middle Ground," [CIO Section 1, Jan. 15, 1999] poses some interesting solutions to growing issues in data warehousing. Mr. Koch, however, does not address one of the basic issues of why data warehouse projects fail: the lack of reconciliation between business and IT management as to whether they are building a data warehouse (or data mart for that matter) or using data warehousing as a way to fundamentally change how data, information and knowledge are managed throughout the enterprise.

Companies that have reconciled this issue in favor of a broader enterprise view—that is, using data warehousing to facilitate change—employ an information-based strategy (IBS). Additionally, an IBS requires a reconciliation of data governance policies, procedures and standards—a.k.a. data stewardship. In this context, data stewardship, like data warehousing, is a business and information management process. And as management processes, data warehousing and data stewardship are inseparable from the theory of business and information politics. Having surveyed many business and IT executives regarding troubled data warehouse projects, the failure to properly address this important distinction between building a data warehouse and using data warehousing to facilitate change has consistently made the top 10 list of lessons learned and things to do differently. In the future, I would like to see

articles presented in CIO that address the difficult business policy and political issues surrounding this important topic.

Richard Kravchuk

Senior Manager

Ernst & Young LLP

Data Warehouse Service Line

New York City



CULTURE CLUB

As someone with an avid interest in organizational culture, I found "Cultural Evolution" [CIO Section 2, Jan. 15, 1999] quite interesting to read. Many of the points made in the article were right on! I do have to observe, however, that one crucial element was missing. The article did not seem to address how hiring someone who is a cultural misfit can be quite costly to the company. It is estimated that hiring a person who does not agree with the terms of the organization's culture will cost the company more than 150 percent of that person's annual base salary. How costly would it be to hire a \$250,000 executive who has a department staff of dozens only to learn that he does not support the company culture? It would take close to a year to figure that out, and many of the top employees of the department would have already left.

How can a company prevent this? With a thorough understanding of the culture (as the article points out) the company can conduct a pre-employment "cultural fit assessment" of all employees. This type of assessment can be administered in a cost-effective way and save hundreds of thousands of dollars in replacement costs.

William G. Bliss

President

Bliss & Associates Inc.

Brewster, N.Y.

wbliss@blissassociates.com

How to Reach Us

E-mail: letters@cio.com

Phone: 508 872-0080

Fax: 508 879-7784

Address: CIO Communications Inc.,
492 Old Connecticut Path, P.O. Box 9208,
Framingham, MA 01701-9208

Web Site: www.cio.com

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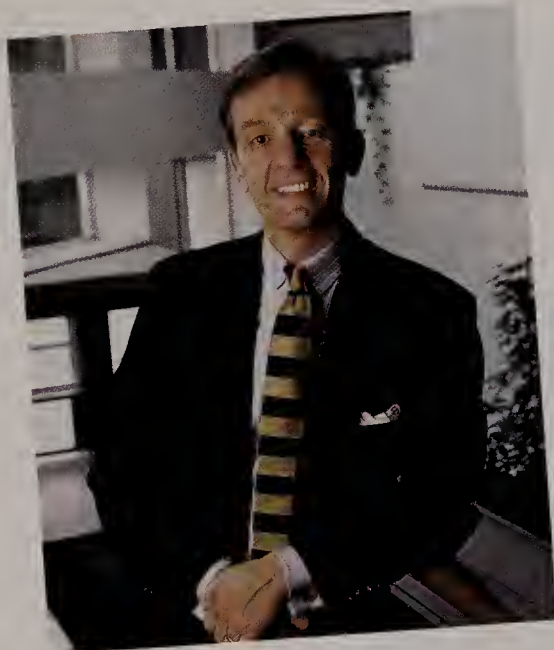
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Publisher's Note

I am dining at Michael Jordan's swanky new restaurant in Grand Central Station. My luncheon guest and I are having a conversation about a pet peeve of mine: how poorly many corporations organize information on their Web sites. In this age of "@Information," I am continually amazed at the lack of respect corporate Web sites show their customers, particularly when the competition is only a click away.

I encourage, no, I implore CIOs to take the time to visit their sites and act as a customer or prospect. How many items do you have to download before the "done" notification appears at the bottom of your page? How long does the



download take? If it's more than seven seconds, you're at a competitive disadvantage.

Simplicity and elegance are in. Complexity and disorganization are out. Does your site need a makeover? As CIO you should issue this edict: Optimize all home page design for notebook computers. Too many pages look nice on the 21-inch monitor of your Web designer but fail the notebook screen test.

How easy do you make it for a customer to find a human being? What about e-mail addresses? Yes, the value of Web sites is that they can give customers lots of information without interacting with an employee. But I am continually

frustrated by sites that seem to say nobody works at the company. The larger the company, the more difficult—almost impossible, in fact—it is to find the name of a person. Or to guess an e-mail address.

As CIO you know which products are profit makers. Are the products on your home page in sync with your bottom line? I am amazed at how many companies feature low- or no-margin products on their home pages.

Since your Web site is under your control, make it easy for customers to share their thoughts about the site with you. Feature your picture and e-mail address prominently. Yes, probably a few more vendors will e-mail you, but I bet so will a lot of customers—and their unfiltered feedback will be invaluable to you in future site design. Submit your home page to a thorough review no fewer than four times a year. And be prepared to spend as much or more time in continual Web development as you did in your efforts to launch your site.

Frank Gens, a senior vice president of International Data Corp., recently said, "we are migrating from the age of dot com to the age of dot compete." Today and in the future the Web site is your customers' first interaction with your organization. Make sure it is the best it can be.

Gary J. Beach

Gary J. Beach
gary_beach@cio.com

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nteen minutes away. A gasket is about



to blow. **Now imagine.** A chip in the engine alerts an electronic service that the driver signed up for when he bought the car. This service locates the nearest garage, books an appointment, provides directions to the driver, pushes his next business meeting back an hour and arranges for a rental car to meet him at the garage. But that's only the beginning. Meanwhile, the car manufacturer is notified of the gasket problem (it isn't the first time!) and while the auto giant considers retooling the line, the service drafts a recall notice and engages the help of a PR firm. **Wow.** A lot is happening here. Car, gas station, rental-car company, auto giant are all seamlessly linked to the Internet. Not as a collection of websites or in a battle for eyeballs. But as a catalyst for the service-based economy. The next chapter of the Internet is about to be written. And it will have nothing to do with you working the Web. Instead, the Internet will work for you. www.hp.com/e-services

The next E. **E-services.**

Trendlines

NEWS, INSIGHT, HUMOR, REVIEWS

Edited by David Rosenbaum

Baseball by the Numbers

OPENING DAY You know the old saying, There are lies, damn lies and statistics? Case in point: Information Builders' "Grand Slam" Web site. (Beware, we are now going to plunge into the arcana of hardball metrics, where the waters run cold and deep.)

Information Builders Inc., a New York City-based software company, has established a Web site for baseball fans that shows off its enterprise analysis and reporting system, WebFocus.

Grand Slam (*baseball. ibi.com*) uses WebFocus to let the browsing fan slice and dice an enormous database of major league baseball statistics from the 1998 season any which way but loose.

Let's say, for example, that we're looking for the ideal leadoff man. What do we want in a leadoff batter? We want him to score runs, so on a scale of importance from 1 to 5, we'll give that a 4. Batting

average? Give it a 3. What's most important to us? On-base percentage. Let's weigh that with a 5. What's not important? Slugging percentage, home runs, RBIs and slugger stats, Mark McGwire stats: Give them all zeros.

With those parameters, who does Grand Slam cough up as the ideal? Houston Astros second baseman Craig Biggio, a terrific leadoff hitter, a guy who gets on base, steals bases and still hits for power and drives in runs.

But who's this after Biggio?

Baltimore Orioles strongman Albert Belle, a musclebound slugger, not a leadoff man. Indeed, we don't get to another true leadoff hitter (Jose Offerman, formerly of the Kansas City Royals, now with the Boston Red Sox) until we get past the New York Mets John Olerud (too slow), the Chicago Cubs Mark Grace (also slow) and Colorado Rockies outfielder Dante Bichette (another big, slow slugger).

So let's fiddle with the parameters. Let's weigh batting average, hits and strikeouts less heavily and increase our emphasis on on-base percentage. Who pops up?

Craig Biggio again. But this time he's followed by San Francisco Giants outfielder Barry Bonds, who could lead off because he's a great player who can do anything. However, no manager would bat Bonds first because it would waste his power. With the new parameters, Offerman moves up to third.

What are the lessons learned? The whole of the game is greater than the sum of its numbers. Infor-

mation Builders has created the ultimate rotisserie Web site. And Craig Biggio should take Grand Slam into his next contract negotiation with Astros management.

For more on baseball and IT, see "A Whole New Ballgame (Sort of)," Page 38.

—David Rosenbaum

Craig Biggio, the best in the game?



Signs and Portents

Y2K Day Two

The first stock market to open trading in 2000 will be in the land of the prophets. That's because Jan. 1, 2000, falls on a Saturday, when all the world's exchanges are closed. But on Jan. 2, one—and only one—market will be open for business: the one in Israel, where Sunday is an ordinary workday.

But whether or not that Sunday will in fact be ordinary is the billion-dollar question. The world will be watching.

Quotable

"We're not a sports team. We're a large marketing organization."

—Bill Bolt, vice president of IS, Arizona Diamondbacks
This off-season the 'Backs spent \$118 million on new players. Maybe now they'll be a sports team too.



Trendlines

More and More Happy Returns

YOUR MONEY April 15. It comes every year. You file, I file, we all file. But how do we all file?

Thirteen years have passed since the IRS started to lurch toward the promised land of electronic filing. And this year America's least favorite government agency is approaching a system that is actually easy to use, relatively painless and available to most taxpayers.

But it's been a long and rocky road.

The feds' first effort, launched in 1986, signed up a handful of professional accountants who were authorized by the IRS to send tax data over a private telephone line. And although taxpayers had to trek to the accountant's office and sign the paper forms, this system attracted 25,000 pioneers.

Six years later the IRS came up with an early version of the TeleFile system by which taxpayers could file simple tax returns using a touch-tone phone. More than 125,000 people tried it the first year, and most of them liked it. Last year nearly 6 million taxpayers used the system.

Now comes e-file, a system the IRS hopes will be a killer app, combining several conveniences that have been introduced individually over the years. With e-file, most taxpayers can visit one of several Web sites operated by tax preparers (for example, Universal Tax Systems Inc. at www.securetax.com, UDS ElectroTax LLC at udstax.com and Intuit Inc. at www.intuit.com) fill out all necessary forms, pay tax debts by credit card or debit card and have any refunds deposited directly to their bank



accounts. According to the IRS, as of the end of February 1999 the agency had received 18.5 million electronic returns overall (up 13.5 percent over the same time in 1998), and self-prepared returns filed online were up 165 percent. E-file has also won the hearts of the revenue departments of 35 states, which allow residents to file state taxes through the same federal system.

Terry Lutes, national director of electronic program operations at the IRS, says the most persuasive feature of the new program may be the speed with which it sends out those refunds—an average, Lutes says, of 16 days. Indeed, Lutes says that of the 24.5 million people who filed electronically last year, only 1.2 million owed the government. The other 23.2 million people were trying to get their money back.

Which, if you think about it, is hardly a surprise. —Art Jahnke

In Search of Form 8863

MO' MONEY Early one Sunday morning in February I sat down to do my taxes. I barely got past the point where I declined to contribute to the presidential campaign when my husband informed me that we were missing IRS form 8863. "It could save us a lot of money," he said, "so it'll probably be hard to find."

He was right. The form was not at the local library, but I figured I was sure to find it on the IRS Web site (www.irs.ustreas.com).

Bright and early Monday, I logged onto the IRS site, clicked on the forms and publications link and did indeed

locate 8863. But without Adobe Acrobat, I couldn't download it in PDF. So I opted for PostScript format. No dice with that, as a message informed me that the selected file "could have been expanded if you had DropStuff with Expanded Enhancer installed." I didn't.

So I called the IRS to request 8863 by fax. Turns out you have to call from a fax machine.

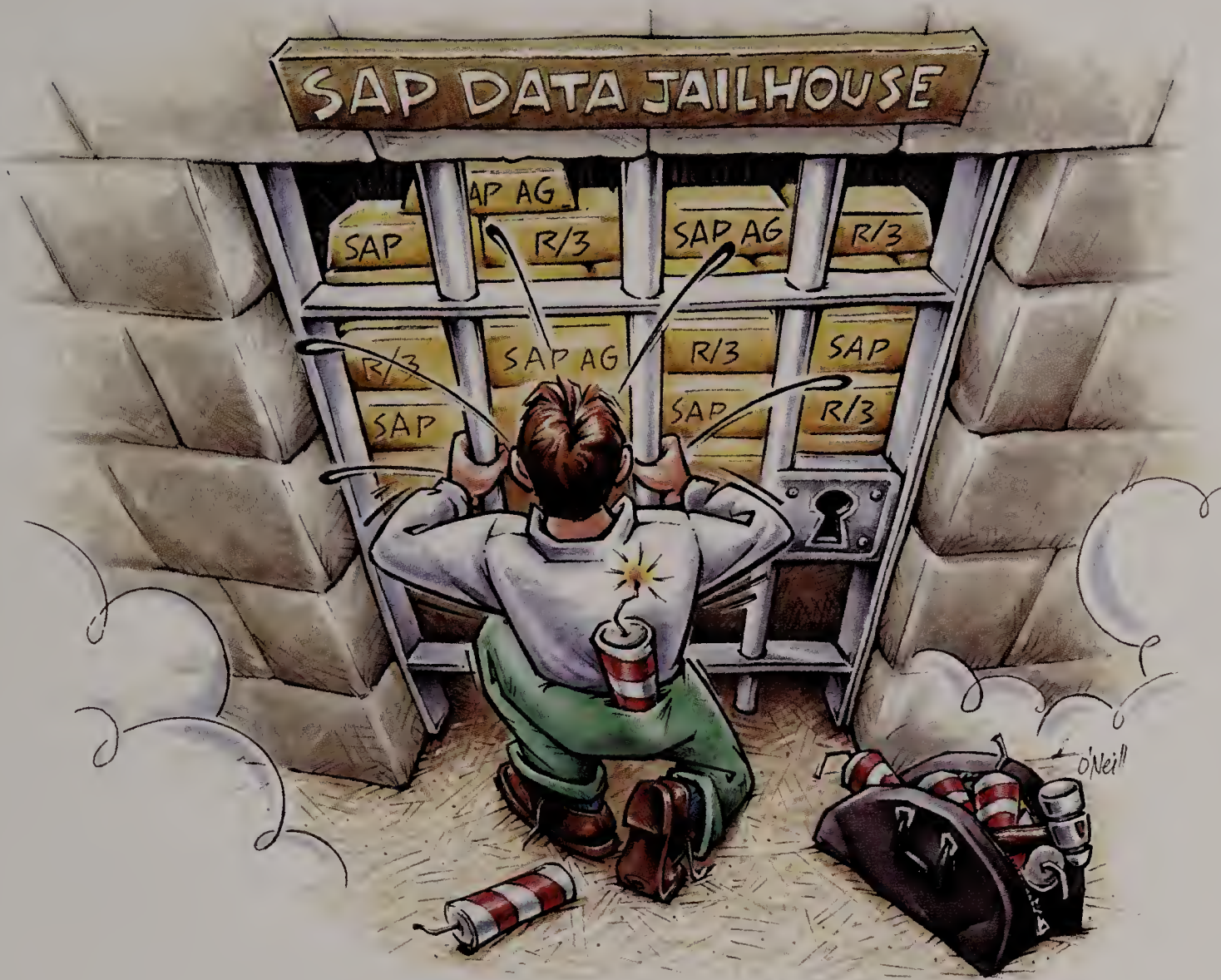
So off I went to make nice with the fax machine. Five seconds into the recorded instructions, the volume faded to the point where I couldn't hear what I had to do to get 8863.

So I went back online. But you can order only the most popular forms (such as the 1040) over the Web. The others you can download. That is, one can but, as I said before, I couldn't.

But surely the IRS would send me 8863 by mail. I called. A Mr. White answered and took my address. I gave him the wrong ZIP code.

I called back within two minutes. "I gave the wrong ZIP code," I told the same Mr. White. Mr. White informed me that there was no way for him to make the change. "Maybe you'll get two forms within 10 days," he said. Maybe. —Megan Santosus

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Trendlines

A Home Page for a People Without a Home

GOD ON THE NET Is the Internet the objective correlative of what Catholic theologian Pierre Teilhard de Chardin called the noosphere: the place where the totality of all human thought combines to create a cosmic oversoul, or, in other words, God?

People are increasingly looking to the Internet, with its oceanic size and multitude of voices, for metaphors for the divine, especially during the Easter and Passover seasons. In an article from the spring 1998 *American Scholar*, Jonathan Rosen, cultural editor of the Jewish weekly *Forward*, compares the *Talmud* (the vast compendium of Jewish law and lore codified in A.D. 500) with the Internet, "where anyone with a modem can wander out of the wilderness for

a while, ask a question and receive an answer." He writes: "When the Jewish

people lost their home (the land of Israel) and God lost his (the Temple), then a new way of being was devised, and Jews became the people of the book and not the people of the temple or the land. They became the people of the book because they had nowhere else to live.... The Internet, which we are continually told binds us all together, nevertheless engenders in me a...sense of Diaspora, a feeling of being everywhere and nowhere. Where else but in the middle of Diaspora do you need a home page?"

For more information about religion sites on the Net, check out blair.library.rhodes.edu/rehtmls/relnet.html. ■

Off the Shelf

Follow the Leader

The Leader's Change Handbook: An Essential Guide to Setting Direction & Taking Action

Edited by Jay A. Conger, Gretchen M. Spreitzer and Edward E. Lawler III.
Jossey-Bass Inc., 1999, \$28

Encouraging the Heart: A Leader's Guide to Rewarding and Recognizing Others

By James M. Kouzes and Barry Z. Posner
Jossey-Bass Inc., 1999, \$22

Flash of Brilliance: Inspiring Creativity Where You Work

By William C. Miller, Perseus Books, 1999, \$25

IT'S BECOME A GIVEN: In today's hypercompetitive and globalized business environment, where information is the most valuable capital one can possess (and possessing it means disseminating it ASAP), the old top-down, centralized, hierarchical administrative structure just won't cut it. The IT age demands flexibility, teamwork, democracy and continuous change. And leadership.

Ah, if we only had the right formula, we could produce leaders on demand. But life isn't like that, and studying leadership outside a contextual frame is unprofitable. In three new books, leadership is considered in the context of change.

The main argument in the 13 essays in *The Leader's Change Handbook* spirals around the nature of leadership, defining it separately from management and even from authority. A leader in a world where no one person can be expected to have all the answers, let alone understand all the problems, really can't be an authority—one to whom people turn to fix something. The leader must be more of a visionary than someone who just cuts costs or improves time-to-market. In the new corporate paradigm, the leader's job, according to the book's editors, is to "design an organization that supports the vision." The leader does this by first communicating the vision, then empowering, energizing and motivating the employees and finally embodying the vision.

John Kotter's excellent essay, "Leading Change," breaks down the process into eight steps: establish urgency, build a powerful coalition, clarify the vision, communicate the vision, walk the talk, remove obstacles, establish short-term wins to maintain momentum, and consolidate gains to institutionalize the changes.

What one takes away from most of the essays in *The Leader's*

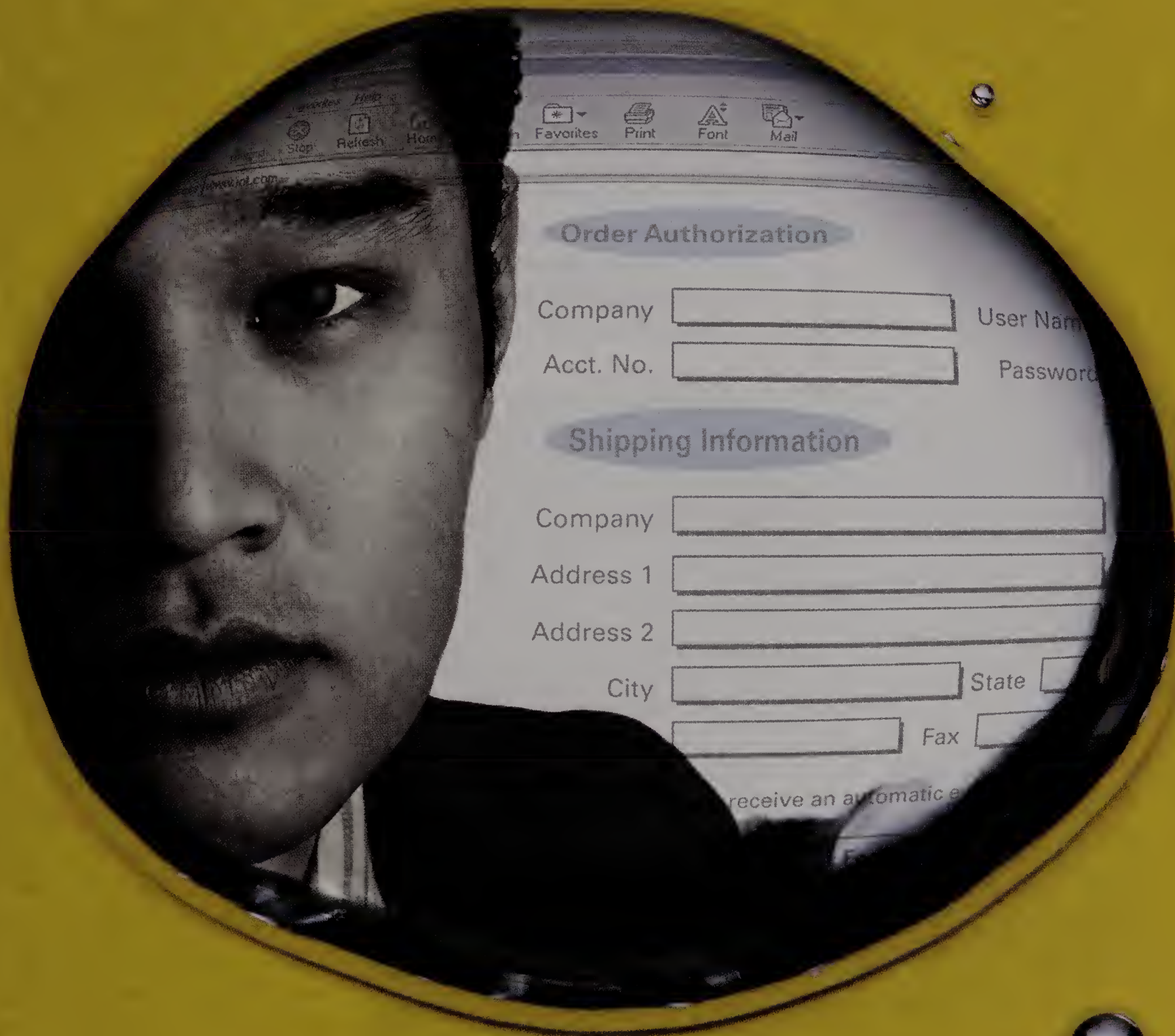
Continued on Page 30



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MERCURY INTERACTIVE

Trendlines

Off the Shelf

Continued from Page 28

Handbook is that leaders can no longer rely on power alone to make things happen. What that means is that the ability to persuade, to articulate, to energize—namely, political abilities—become ever more important.

Encouraging the Heart, in spite of its New Age-y title, is basically a collection of best practices in being this kind of politically sophisticated leader. Work, authors James M. Kouzes and Barry Z. Posner insist, is not its own reward. The leader must supply rewards by first recognizing (which requires being open, alert and present) and then celebrating (which means being generous and energetic) the individual employee's accomplishments. The environment this produces, the authors believe, generates the internal cohesion necessary to make an organization flexible and risk-encouraging.

Flash of Brilliance takes *Encouraging the Heart's* argument one step further and perhaps over the edge. Not everyone will be able to read a book that begins, "A new era trembles to be born," nor one that defines spirituality as a best practice. But like its brothers, *Flash* posits a new business environment in which the soul of an old machine is dangerous to the corporate health of today's enterprise. And once William C. Miller gets beyond the preachy, he provides a number of tools useful in constructing new paradigms.

—David Rosenbaum

Dial S for Scam

ON THE ROAD The call from the benefits administrator at CIO caught me off guard. "Polly, have you been making any calls to Kuwait for stories?"

That one was easy: No. But someone was reaching out and touching someone else far away. Apparently some crook peeped over my shoulder in the airport a few months before as I dialed the numbers of my corporate calling card.

Stealing calling card numbers is nothing new, but new scams are emerging all the time. For telecommunications providers, industrywide losses from fraud reach \$4 billion annually, according to Lee Ann Kuster, public relations manager for consumer markets at AT&T Corp., CIO's long-distance service provider.

High-traffic areas like airports are a breeding ground for such crimes. "Shoulder surfing" is one of the most common scams, and now criminals don't even need to breathe down your neck to turn the trick. Some camp out in upper levels of terminals with



high-powered binoculars or even use video cameras from airport parking lots to capture the calling card numbers of travelers.

The latest scam is even sneakier. The bad guy calls a pay phone in an airport using equipment that first disables the ringer and then simulates a dial tone. An unlucky traveler picks up the phone, unaware that it is connected to the bad guy. She hears a dial tone and punches in her card number. The bad guy's equipment records the tones and converts them into numbers and voilà! someone is calling his cousin in Kuala Lumpur on the traveler's dime.

So who pays for the fraud? In my case, AT&T picked up the tab for the calls to Kuwait, but in theory the card holder is liable for the charges, says Burke Stinson, a representative for AT&T. Often the phone company will

pay your bill if it's established that the calls deviate from your calling history. But if it happens a second or third time, you may not be so lucky. For years AT&T has used technology that monitors customer bills for unusual calling patterns and alerts the fraud department before too much damage is done. But there are a few simple actions you can take to help prevent fraud from happening in the first place, according to AT&T (see "Protect Yourself," above).

—Polly Schneider

PROTECT YOURSELF

- Use pay phones with swipe-card terminals whenever possible.
- Be aware of your surroundings. Watch for suspicious behavior from people at nearby pay phones.
- Stand as close as possible to the phone when dialing.
- Never recite your card number out loud to the operator.
- When you pick up the phone to make a call, hang up, wait 15 seconds, then make your call. (This prevents the simulated-dial-tone scam by breaking the bad guy's connection.)

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Leveraging Gen X

*Sure the new generation of workers is different.
That's why they're good for business.*

BY MINDY BLODGETT

ARE THOSE ANNOYING GEN X-ers all that different from the annoying Baby Boomers (or older) who are hiring them? The answer, for the most part, is yes. But rather than worry about how to shoehorn them into your corporate structure, you might as well learn from them. After all, their expectations and habits will define the workplace of the future. And if you don't understand their desire for flexibility or the fact that they expect to learn as

they work, you could find your IT department in a state of continuous, chaotic turnover—a permanent, intractable staffing bind.

Bruce Tulgan, 39, author of *Managing Generation X: How to Bring Out the Best in Young Talent* and founder and president of the RainmakerThinking Inc. consultancy in New Haven, Conn., says that the Gen X style of blurring the boundaries between the workplace and the home, between the personal and the professional, fits well with the needs of the millennial corporation.

"In today's global economy, employees and their employers need to think about their working lives in a whole new way," Tulgan says. "Everything is turned on its head. [Job] security is not about stability; it's about mobility. The very same forces that are changing today's workplace are working on Gen X, and they are dovetailing."

In the new order, Tulgan suggests, don't worry if your staffers demand flexible hours; leverage it to your advantage. For example, if you are willing to allow employee X to work a short Friday in exchange for putting in a few longer days because of a project deadline, then he might be more willing to hold that 3 a.m. conference call with the client in Tokyo.

Part of succeeding as an enterprise means successfully managing your staff, and these days that means working to turn your culture into a place the Gen X-ers will want to call home.

A Minus Becomes a Plus

Marian Lucia, 44, operations and systems vice president for the Prudential Insurance Co. of America institutional investments group in Newark, N.J., knows that her new employees are, well, different. She notices, for example, that "they'll always send an e-mail rather than pick up the phone." She notices that "fitness center memberships are very, very big with this group." Most important, she notices that because Gen X-ers are in such high demand, they're hard to recruit and even more difficult to retain.

Indeed, some managers wonder why they should invest in training a new employee if she's going to take those hot new skills—skills you've paid for—and jump to another company. That can't be good for the bottom line.

On the other hand, a September 1998 poll conducted by The Gallup Organization Inc. in Princeton, N.J., revealed that employees between the ages of 16 and 32 were more likely to stay with companies that invested heavily in training.

So what's a CIO to do?

Frank Caccamo, 59, corporate vice president and CIO of the Reynolds & Reynolds Co., an information management systems firm in Dayton, Ohio, now sees the ways in which Gen X-ers (who comprise between 30 percent to 40 percent of his IT staff) approach their worklives as a net plus for his business.

For instance, Caccamo says his Gen X employees are concerned with how their IT skills will fit into the enterprise. "This is different from some employees who have been around a longer time who are often just interested in the task at hand," Caccamo says.



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As a way of opening up communication, helping IT employees see the nature of their roles and inviting input, he instituted regular all-hands meetings in which everyone but help desk staffers gives status reports on major initiatives. "These meetings are in direct response to requests from IT employees," says Caccamo, and "the whole employee base gets a lot out of it." Sometimes the employees perform skits at the meetings, and members of the leadership team will wear silly costumes. (Caccamo believes that Generation X is used to getting its information spiced with entertainment.) Caccamo says the important business message is, "Doing well in IT requires teamwork, and here is how you can develop your [team] skills."

Reynolds recently changed the way work was allocated, partly in response to its employees' desire for teaming and working outside the tight design of their jobs. All employees participated in this exercise. Managers spent between four and six months meeting with more than

200 IT employees in what Caccamo calls a "whole career pathing process." After reviewing their goals and experience as well as evaluating skill levels, employees were given skill ratings and put in "job families."

This restructuring was done to put IT more in line with the company's business directives, Caccamo says, but the result was also in line with what many employees, especially Gen X-ers, were saying they wanted. "One of the things we have found is that [Gen X] employees need to feel that they have some say in how things work. We used to have a very tight design for our jobs. So we changed that. We created a common set of job families with a corresponding skill level.

"The Gen X-ers let me know they liked this process. They appreciated the fact that management had not gone off in a corner and just did something to them.

Caccamo says that Gen X-ers have also pushed to loosen up the hierarchy surrounding promotions and communication. "We want employees to expect a straight answer in an open forum," he says. "And if you don't, you should be able to go around the hierarchy and get your answer. I tell my staff members that if they don't like my answer to something, they should come and see me and press

CIO John Caccamo believes that Generation X is used to getting its information spiced with entertainment.

me. I don't get a lot of takers on that—but the Gen X-ers are usually the ones who do. I find that I have to respond quickly to requests for new assignments—within reason of course—because if I don't, they may leave. Their loyalty is less deep, and frankly, with all the downsizing in corporations today that's a smart way to be."

As an example of how Gen X-ers function differently within the corporate environment, Caccamo cites a Gen X-er who came to him and lobbied heavily for a shot at a job for which he was not being actively considered. "Older folks tend to want to be tapped," Caccamo says. "But this individual wanted his name in the ring. I ended up giving him the job because he had good arguments. Had he gone through the normal process of having his manager review it and get his request to me, it might have taken longer and maybe someone else would have gotten the job."

Talkin' 'Bout His Generation

Robert Blackburn, 26, is a manager of application developers who has worked at Reynolds for more than two years and previously worked for Electronic Data Systems Corp. He says one of the things he appreciates about worklife at Reynolds is that the atmosphere is "less corporate" and more family-oriented than that of his previous job. At Reynolds, casual dress is encouraged and the atmosphere has a free-and-easy quality Blackburn enjoys. He also appreciates the job's flexibility, something he says is important to him.

"One week I may have to work really

Management Tips for the Gen X-er's Boss

Be good to them, they'll be good for you

BRUCE TULGAN, FOUNDER AND PRESIDENT OF THE NEW HAVEN, CONN.-based RainmakerThinking Inc. consultancy and author of *Managing Generation X: How to Bring Out the Best in Young Talent*, says that the Gen X-er's need for more control over his worklife and flexibility in the workplace typifies the new "free agent" career path prevalent in today's economy.

He recommends these best practices to keep Gen X employees happy.

- Use the orientation period as an opportunity to start a "personal retention plan." Tulgan calls this "career planning on day one." Tell the employee you want a long-term relationship with him, and with his help you want to figure out where your organization fits into a long-term career path.
- Focus on training. "You have to have just-in-time training programs to bring people up to speed quickly," Tulgan says. "And while Gen X-ers want to manage themselves, they don't know how, so give them training in project management."
- Manage like a coach, giving feedback fast and frequently. And be specific—tell employees exactly what you want and when.
- Provide nonfinancial rewards such as giving employees more control over their schedules through flextime and telecommuting. Also provide them with ways to put their personal stamp on projects so that they have a sense of mission and commitment that goes beyond financial compensation.

—M. Blodgett

long hours because of a project. And I'm willing to do that, but they are flexible enough so that if it isn't called for, you aren't expected to do that every week," he says. "That's good in today's environment. They respect the fact that if I get the job done, a strictly defined workday is not necessary. They also do things like provide onsite dry cleaning services, making it easier to do my job and keep up with errands."

Blackburn thinks the main difference between his generation and the company's older employees lies in the nature of their goals. "People my age tend to like change, to not want to be pigeonholed, to get a lot of different experiences, to be able to move across the organization," Blackburn says. "Sometimes older folks seem to fear change more. They want to master something and then stick with it exclusively. I see Reynolds changing more along the lines of our generation, to moving people throughout the organization to keep up with changes. When

you're in IT, you don't want to get stuck somewhere because technology changes so fast and you could get left behind."

Stalking the Gen X-er

Gen X-ers appreciate creativity in both management techniques and in recruiting tactics, CIOs and human resources managers say. For instance, at Prudential, Cindy Lowden, 40, vice president for succession planning and accelerated development programs, discovered while recruiting on campus that Gen X-ers were attracted to the company's strategy of involving employees in community service. "I was making small talk with some students when I mentioned the global volunteer day we have," Lowden says. "All of a sudden this became a hot topic."

So the next time Prudential recruited at Wellesley College in Wellesley, Mass., the company devised a hands-on activity. Rather than simply having Prudential employees talk up their jobs, they set up an assembly line for students and

employees to fill backpacks with toothbrushes, soap, snacks and other items for children who have been taken from their homes in court actions and are on the way to a foster home or an institution. "It took a lot more logistics," Lowden says. "But it was great for the students to chat with the recruiters and employees while getting something accomplished. Our attendance quadrupled over the last recruitment session."

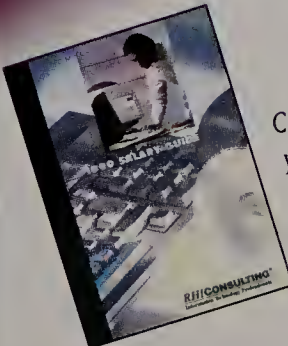
Tulgan says that by listening more closely to Gen X-ers, companies can find the keys to success. "We are all moving into the workplace of the future together. It's all about competing for the best people. And the best people are thinking about their worklives in a whole new way. [Employers] have to lose their attachment to the old-fashioned career path. We can all learn from the emerging workforce and generation." **CIO**

Senior Writer Mindy Blodgett can be reached at mbloodgett@cio.com.



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A Whole New *Ballgame* (Sort of)

It's Opening Day and the grand old game is being dragged into the Information Age, not always willingly.

But IT is surely changing baseball from a game of intuition and heart into one of research and analysis.

BY CHRISTOPHER KOCH

There is a moment in baseball, just before a pitch, when pitcher and batter lock eyes, each trying to figure out what the other is going to do, neither knowing for sure. It's the moment when fans and players share the butterflies, share the same uncertainty. Fans revel in it, but baseball managers and players spend careers trying to reduce the uncertainty contained in this moment through a neurotic obsession with information—knowing as much about the opponent as possible.

Reader ROI

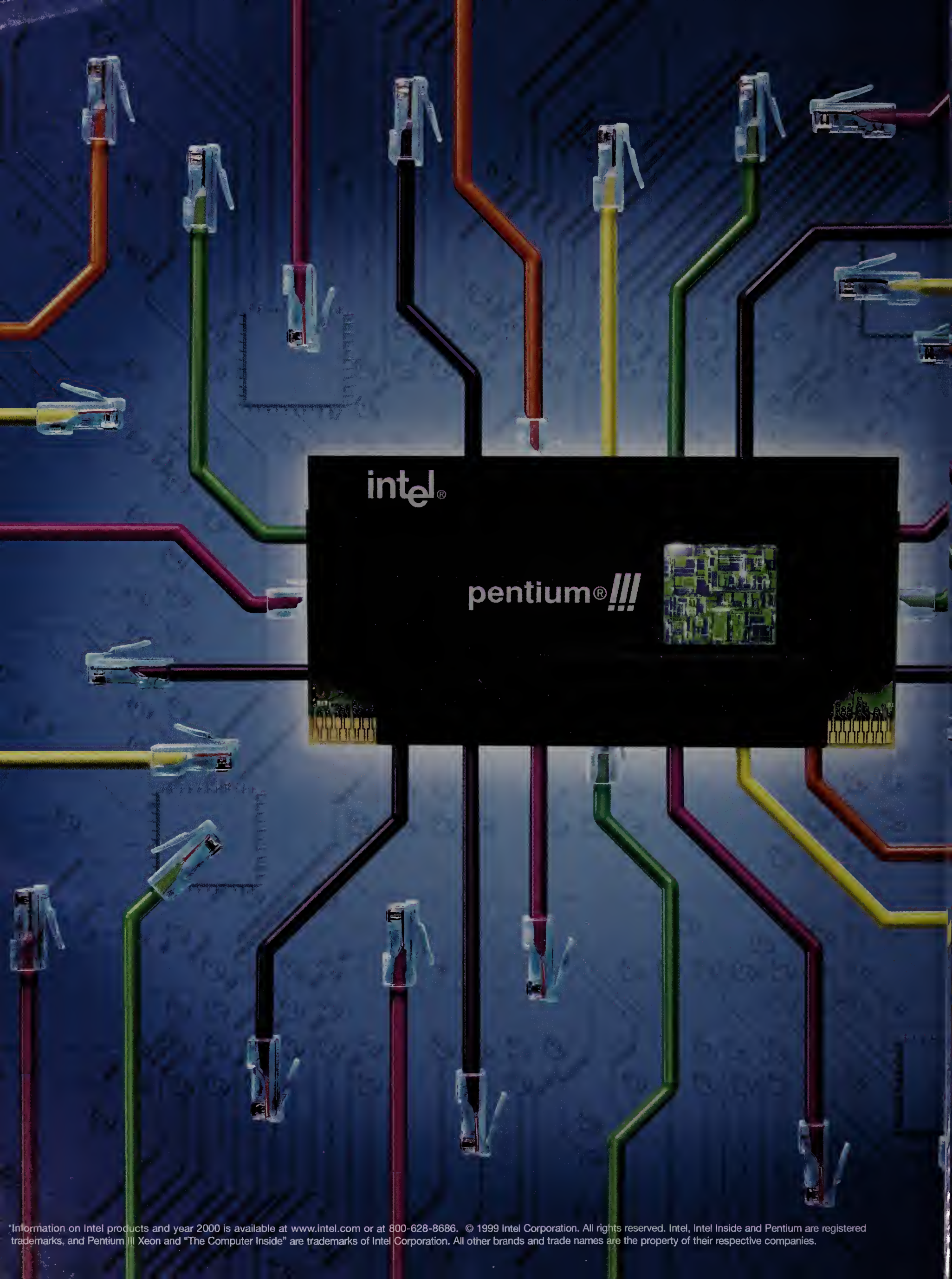
IN THIS STORY YOU WILL LEARN

- How baseball teams use IT to gain competitive advantage on the field
- How small companies can compete with the giants by using IT to become customer-friendly

For most of this century, information gathering in baseball was more an exercise in collective memory than a true science, full of hunches, instincts and notes scrawled on scorecards and scraps of paper. But as the 1999 season kicks off this month, technology is turning the game's information neurosis into a more organized and constructive pastime. Players, managers and the game's own

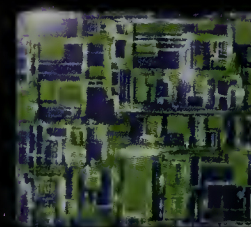


In the Arizona Diamondbacks' state-of-the-art Bank One Ballpark, Vice President of Information Systems Bill Bolt is the Babe Ruth of bandwidth.

A black Intel Pentium III processor is centered in the image. It is surrounded by a dense network of colorful Ethernet cables (red, green, yellow, black) that branch out from the processor's edges, resembling a complex circuit board. Each cable ends in a standard RJ45 network connector. The background is a dark blue with faint, light blue circuit traces. The processor itself has the 'intel' logo in the top left, 'pentium III' in the center, and a small image of the processor die on the right. The bottom of the processor shows gold-plated pins.

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Chicago White Sox Director of MIS Don Brown loaded computer games onto his scouts' laptops in order to entice them to turn them on.

breed of spies—scouts—are tapping information into laptops that feed intricate database programs producing baseball's first generation of true competitive intelligence, empirical data stored on hard drives rather than inside the skulls of the game's devotees.

This old game of intuition and heart is becoming one of research and analysis, on and off the field.



On the Field

The Supply Chain: Scouting

BETWEEN INNINGS OF THE 1998 World Series, New York Yankees catcher Joe Girardi spent much of his time in the dugout thumbing through computerized "spray charts" that show where the San Diego Padres hitters hit the ball as well as graphics highlighting their weak spots in the

strike zone so that he could call the appropriate pitches the next inning. "The Yankees started using the service in 1996, and they won the Series that year," says Randy Istre, whose Minneapolis company, Inside Edge Inc., collects and sells information to the Yankees and other teams. The Yankees pay Inside Edge \$41,000 per regular season for its service and half that much again if the team makes it to the playoffs. "The Marlins started using it in '97," continues Istre, "and they won the [1997] Series. The Tigers used it and went from the worst team in baseball in '96 to just under .500 in 1997. It makes us wonder if the power of this information isn't showing in some of the teams' results."

Istre's service isn't revolutionary, just more thorough. Advance scouting, that is, keeping track of what the other teams are doing, has been practiced haphazardly by major league teams for years. But tracking through a database the details of every pitch an opponent throws and everything a hitter does to defend himself is new and growing.

This is only part of baseball's larger quest to know all there is to know about

a player, from the time he first cuts a wide swath through his high school and college leagues to the day he strides off the field of a major league ballpark for the last time. The teams contract with baseball-crazed programmers to create their own proprietary software to track every player's (not just their own) contract history, injuries, psychological makeup, and athletic strengths and weaknesses. All this information helps determine in what game situations he performs best and what types of pitches he likes (or hates) to hit (or throw).

But the information is most valuable in determining how much a player is worth. Baseball is becoming a game of payrolls as much as of hits, runs and errors, where the teams with the most money get the best players. The ability to pull player histories out of a database is one of the most valuable tools teams have in making trades and wrangling over contracts with players.

"Scouting is the most valuable application on the front end of baseball," says Bill Bolt, vice president of information systems for the Phoenix-based Arizona Diamondbacks (as well as for the NBA's Phoenix Suns). It's a three-tier system: amateur (high school and college), professional (minor league player development) and advance (competitive intelligence about other major league teams). Scouting applications track player development on all three levels, at a big cost for the teams, which support their own networks of (six or so) minor league clubs. Baseball players spend more time in development than almost any other pro athlete—at least two years in the minors before they hit the majors. So keeping tabs on everyone helps the teams reduce cycle time and expense.

"Most baseball people are still in high school when we start tracking them," says Bolt. "They're looking to get lucky on Saturday night, and we're looking to find a third baseman. Our bet is this kid will be valuable three to five years after we first meet him."

The teams pride themselves on gathering nuances, like personal presence on the field, and cross-references, like testi-

mony from a Little League coach, about a player whom no other team is looking for. Each team's set of scouting applications is considered its IT crown jewels, and IT leaders refuse to share their secrets with the press or each other—a collective sense of propriety that seems a little exaggerated.

"About 70 percent of the data-entry fields in these programs are the same across all the teams, but there's 30 percent that teams try to make their own to look at things other teams aren't," says William N. Duffy, project manager for sports solutions at IBM Corp.'s Global Media and Entertainment Industry division in Atlanta. IBM is one of a handful of major vendors trying to crack the scouting application market. IBM scored with the New York Mets, but most team IT leaders sneer at the concept of a "packaged" scouting application.

"IBM tries to come in and say, 'Here's our view of baseball, and everyone should buy our application,'" rails one major league executive who speaks on the condition of anonymity. "But they don't know how the teams work. Each team does things slightly differently. It's true competitive advantage," he says.

Change Management: Old-Timers

PART OF THE REASON WE LIKE baseball is because it doesn't change much. What drives IT leaders in baseball crazy is that team organizations don't change much either. Scouts and managers make the Luddites seem like pushovers.

Don Brown, director of management information systems for the Chicago White Sox, still has nightmares about introducing laptops to the White Sox scouting organization in 1991. He claims that the Sox were one of the first in the league to do so. He had to set up the laptops so that they immediately booted up the scouting application and displayed the first required form. "The most important thing was to make it easy for the scouts to enter and send the information," says Brown. To get the scouts to turn the damned machines on in the first place, he parceled out computer golf games and other adult entertainment (scouts are not '90s guys) to

those who e-mailed him reports. Those who didn't, didn't get the "entertainment" loaded on their machines. It didn't take long to get compliance.

To his credit, Brown is not proud of what he did to get scout buy-in. "They're on their own with the games now," he says. What they get instead are CD-ROMs with video of the players they'll be scouting in the next town. "The quality isn't great," says Brown, "but it beats lugging a VCR on the plane with you."



The Front-End App: Consumer Focus

THE QUALITY OF THE CD-ROMS will continue to improve, however, not just because of advances in technology but because baseball is becoming a media game owned by media empires. The business of baseball used to be governed by a cordial fraternity of moneyed families (the Yawkeys, the Wrigleys, the Whitneys and so on) who treated their teams as trophy businesses where profit didn't necessarily come first. These families kept the hardball out of baseball and channeled it into the businesses that enabled them to afford the team in the first place.

No more. Today the families are being displaced by powerful media conglomerates like Rupert Murdoch's Fox

baseball teams to get their name out there and to own the local broadcasting rights," says a source from a team owned by one of those media empires, who requested anonymity. "Once they own the team, they don't have to keep bidding for the rights to broadcast games."

The most important advantage these companies offer to their teams is resources. They have the deep pockets to compete in the salary slugfest that has gripped the sport in the last few years. Last season only three teams with winning records—the St. Louis Cardinals, Toronto Blue Jays and San Francisco Giants—had a player payroll under \$48 million. The World Series-winning Yankees spent \$73.8 million on players last year (second only to the Baltimore Orioles), a stunning contrast to the Montreal Expos, which spent the least—\$8 million in a game where the average player salary is now \$1.4 million—and finished with the third worst record in the majors. In 1988 the difference between the lowest team payroll and the highest was \$15 million. Last year that figure was \$66 million, a 340 percent increase.

For teams that cannot afford to compete in the payroll game, technology is becoming the preferred route to enhancing the team's return on investment. The Oakland Athletics spent \$18.6 million on players last year and finished in the American League West's cellar. Realizing that baseball is at its core a service business, the A's use database marketing to learn more about the likes and dislikes of customers (fans). The A's are one of only three teams in the majors (the Padres and the Giants are the others)

Powerful media conglomerates are beginning to view baseball as a strategic part of their core business holdings.



Entertainment Group Inc. (the Los Angeles Dodgers), Tribune Co. (the Chicago Cubs), Turner Broadcasting (the Atlanta Braves) and The Walt Disney Co. (the Anaheim Angels) that view baseball as a strategic part of their core business holdings.

"The media companies are buying

that have created "fan loyalty" programs. Like their frequent flier forebears, they reward A's fans for showing up consistently (if you went to 50 home games last year, for example, you might have gotten to take batting practice with the team). More than 32,000 fans signed up for the program last year (its first), and



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there was a 15 percent reduction in game no-shows despite the team's poor record, says Dave Alioto, the A's senior director of sales and marketing.

Showing up is important to a team's profitability. It's not enough to sell a season ticket anymore. To make money you have to have someone in that seat each game buying team logo caps and hot dogs and beer and programs. If his team goes belly up in the standings in July, Alioto needs to throw in other rewards to keep the season ticket holders coming out in August and September.

The loyalty program, which includes swipe cards that offer discounts on team merchandise and with local retailers (and provides the A's with your consumer profile), gives Alioto powerful information about the buying habits of fans. "We ask them about the food, about the products they buy outside the park and the things that draw them to the park," he says. He has already dropped one of his personal favorite marketing programs, batting helmet day, after fans dissed it on the survey.

The program puts Alioto ahead of most of his contemporaries in a sport where marketing is practiced abysmally, if at all. The majority of teams don't know who the next generation of customers is, where they are or how to reach them. Most marketing efforts focus on season ticket holders, a group that's already buying the product. Indeed, if there is a crisis in baseball besides the dangerous game of salary Russian roulette, it is that few teams do much of anything to counteract the negative effects on average fans of higher ticket prices and mercenary players and owners. The Web, which baseball is only beginning to embrace (see "The Baseball

The Corporate Advantage: Efficiencies

ALTHOUGH IT IS BEING USED BY the small market teams to enhance their revenue streams and thereby compete, it is the corporately owned teams that are positioned to win the IT game over the long haul. What owner knows how to market products better than Disney? Who knows more about sports broadcasting than Murdoch's News Corp., which runs the Fox network in the United States and Sky network in Europe and Asia.

These corporate advantages are even more apparent at the IT level. Carl Rice is IS manager of the Chicago Cubs, and the list of things he doesn't have to worry about by virtue of his team's ownership is almost as long as the list of things he does.

Financial application systems for payroll and accounts payable are handled by Tribune's corporate IT department. Nor does Rice have to beg for money for network upgrades and new business applications; the Tribune people do all that and at a much faster rate than the IT leaders at independently owned teams could ever hope to justify to management.

"I don't have a Y2K project," Rice proclaims smugly. "Tribune is a publicly traded company and they are making sure all the systems they use are compliant, including ours." Rice is free to work on IT issues that have a real impact on the Cubbies—scouting systems and support—and on the business—marketing support and the Web site (which most teams have to outsource).

But Rice still faces the problems that any of his colleagues in baseball and in

stressed-out twentysomethings who trade pay for experience and proximity to the show. IT staffs in baseball are usually about two or three people. But baseball club IT leaders—about the equivalent of a CIO of a division in a corporation—have a leg up on their peers: Not only can they waltz out of their offices after work, stroll down the corridor and take in a game, they can mix it up with all the latest media and communications technologies—something those in less media-centric industries cannot do.

Baseball's IT leaders can also bask in the rare honor of being sponsored. NEC USA Inc. is a title sponsor for the Diamondbacks and supplies Bill Bolt with the PCs and servers he needs for both the business and baseball sides of the organization. The sponsorship arrangement has its share of glamour, cachet and "access," as they say in show biz.

"I've met [Bill] Gates and [John] Sculley [former head of Apple Computer]," Bolt beams. "If I worked for a very good insurance company I wouldn't have those opportunities. And because NEC is sponsoring our computers, I can talk directly to the top NEC people and Intel people. They wouldn't return my calls otherwise."

Extra Innings: Nostalgia Nouveau

BOLT SEES THE NEW REALITIES OF baseball more clearly than some of his colleagues, perhaps because his office sits in one of the best examples of that new reality: the brand-new Bank One Ballpark (a.k.a. the BOB). Consider that in 1998, a year when Mark McGwire and Sammy Sosa resurrected Babe Ruth's ghost in a delightfully diplomatic home run derby and the Yankees reincarnated their dynastic dominance, the Diamondbacks—a team with no history whatsoever, the team tied for the third worst record in the entire major leagues—outdrew the Yankees and every other team except for two, the Orioles and the Colorado Rockies.

These three teams have one asset in common that sets them apart: They have ballfields that take their cue from the grandmaster of outdoor entertainment venues, Disney. These parks—the BOB



Baseball club IT leaders can waltz out of their offices after work, stroll down the corridor and take in a game.

Web Site Standings" at www.cio.com/archive/041599_baseball.html), and database marketing are two ways that baseball can use technology to refresh the current crop of fans.

corporate America struggle with—people shortages. Baseball spends money on the top jobs like CFO and vice presidents of marketing and IT, but the lower-level staff positions are manned mostly by

The Oakland A's use swipe cards to give Senior Director of Sales and Marketing Dave Alioto powerful information about the buying habits of A's fans.

in Phoenix, Oriole Park at Camden Yards in Baltimore and Coors Field in Denver—aren't just places to sit, they are baseball theme parks that evoke the game's most strategic entertainment asset: nostalgia.

The BOB is a new downtown building that looks old, with lots of brick and painted steel, nooks and crannies and idiosyncrasies that help transmit a sense of community and history, even though the former is so far unearned and the latter to date nonexistent. The BOB does so while thumbing its nose at the self-righteous, sanctimonious assumption that the grand old game alone is enough to entertain a nation weaned on TV and theme parks. Fans at the BOB can have a great time without seeing so much as a single pitch. They can drink and eat in an open-air restaurant in left center field, frolic in a swimming pool behind the right field fence or kill time in an arcade full of virtual baseball games.

To build this kind of experience around the fans, you need a capable technology infrastructure, all of which runs off of a single multimode fiber-optic cable—Bill Bolt's cable.

Bolt is resigned to the fact that, unlike a CIO in a more businesslike operation, he can't hope to control all the new technology systems that the team and business tenants at the stadium use. The stadium's food vendor alone brings in a temporary workforce of 2,000 to 3,000 people each game, all of whom have to keep track of their sales via computer. So Bolt acts as a mediator between the technology vendors and the in-house functional people, looking for conflicts



between the proposed new toys and the existing infrastructure and application systems. But the fiber acts as Bolt's control point for access and change. When the tenants want to change their systems in a significant way, they have to come to Bolt to request more bandwidth. "That's the tip-off to their plans," he smiles.

The fiber handles just about everything, integrating scoreboards, controls for the stadium's vast air conditioning system (to take the edge off Phoenix's 105-degree summer afternoons), security (with 90 cameras placed strategically around the park), lighting, fire alarm, cable television and the stadium's retractable-roof control system.

This system, in aggregate, is what makes the experience of baseball in the BOB so much fun for fans, and Bolt knows that if the experience doesn't continue to improve, someone will take that technology ball away from him. "We're in the honeymoon period with the fans," he says. "But if we don't win, they'll eventually stop coming, no matter how

nice the stadium is."

That's why the front office of the Diamondbacks, led by owner Jerry Colangelo, who also owns the NBA Phoenix Suns, spent a league-record \$118 million this off-season bringing marquee ballplayers to Phoenix, and it's why Bolt has been running around the BOB for the last three years (two of them before the team even started playing) throwing together a state-of-the-art (for baseball, anyway) IT infrastructure.

"The money won't be there for me to do this when the stadium is running 40 percent full," he says. "That's why I'm spending money now. To get ready."

Bolt doesn't know if the Diamondbacks will succeed on the field this summer, but as the season begins he is enjoying the uncertainty just as much as all baseball fans do. After all, that's why they play the game. To find out who wins, who loses. **CIO**

Senior Editor Christopher Koch can be reached at ckoch@cio.com.

On Our Web Site

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For our analysis and links to major league teams online, see "The Baseball Web Site Standings" at www.cio.com/archive/041599_baseball.html.

PHOTO BY KENT HANSON

PLAYING BY THE RULES

BY ALAN S. KAY

By rescuing the procedures that govern your business from the dark recesses of code, the disconnect between IT and business could finally be healed

DENNIS JOHNSTON WAS BROUGHT IN TO NORWEST FINANCIAL INC. three years ago to evaluate the bank's systems. His conclusion: "As our businesses were changing dynamically as every day passed, it was more and more difficult to keep the legacy system in sync with the business's needs. It was clear we were going to get to a point where [the legacy system] just wouldn't suffice."

Reader ROI

BUSINESS RULES ARE OLD, BUT THE Business Rules concept is new. In this story you will learn

- ▶ What the Business Rules buzz is about
- ▶ How the technology is supposed to work
- ▶ Why a project-oriented approach is best
- ▶ Why it hasn't yet caught on widely

Johnston, a senior vice president at Norwest (now a subsidiary of Wells Fargo & Co.), considered reengineering the core systems, but that, he said, would just put a shiny new front end on a tired old engine. Instead he decided to construct a system from the ground up—one that would deliver 100 percent of the functionality in the existing system and would be fully responsive to the myriad demands of the future. After much research, Johnston decided on a system that relied on the definition, capture and storage of business rules.

⊖ RULES? WHAT RULES?

What are business rules? No mystery. They are nothing more than the statements that define or constrain every aspect of a business—that assert what its structure is or delineate its behavior in specific situations. For example, it would be the rare business that didn't have a rule that said that every customer should have an account number. Some businesses may have a rule that says that the record of a purchase order may not be entered if a customer's credit rating is not adequate. Logic dictates that that rule would generate another: Customers whose purchases exceed a certain dollar amount must undergo a credit check.

Thomas Yanchek, a business rules specialist who bears the title of application architect at Atlanta-based United Parcel Service of America Inc., calls these obvious and not-so-obvious rules the "Ten Thousand Commandments" of your business.

In the modern enterprise, thousands of policies and procedures guide how a business functions—how the books are kept, what discounts are given to which customers, when commissions are posted to salespeople's accounts, even when vacation time can be used. Of course these thousands of policies and procedures can't be stored in the CEO's head. And a loose-leaf manual containing all of them might be good for stopping a door but not much else.

In fact in most enterprises rules aren't formally identified or stored at all. Instead, though company executives rely on them daily, they exist only in the application code that runs the business processes. Thus the people most intimately involved in shaping how a business runs today are not the business units' policy-level executives but rather the IS staffers who convert business requirements into those millions of lines of code.

From this disconnect—between the company executives who shape the business and the IS staffers who actually create the applications that reflect the rules—flow a number of problems and, proponents of a Business Rules methodology argue, an even greater number of opportunities. The new Business Rules approach is intended to reconnect businesses to their rules by identifying them and making them explicit. And, in so doing, to align IS with the rest of the enterprise, thereby creating efficiencies in all business processes.

Say, for example, a company without explicit business rules decides that in order to run a store on the Internet it needs to change from \$10,000 to \$5,000 the trigger point for the credit check in its automated order-entry system. To do so, a software engineer or programmer would first have to locate the routine within the code—a process that could take days, depending on the complexity of the application and the adequacy of the documentation. Then he'd have to rewrite the code to change all instances of the \$10,000 reference to \$5,000.

If, however, that rule had been previously identified and documented, the

programmer could skip the hunt through the code and—without passing Go and without paying \$200 million—move directly to the relevant sections and change the \$10,000 references.

And, most tantalizingly, if the rule had been stored in a Business Rules management repository, the routine might not need to be touched by a programmer at all. Anyone could find and change the rule.

And that means your IS people will have been transformed into business people.

The Business Rules-based consumer financial services system that Norwest's Johnston eventually created was named Sapphire. He says it provides comprehensive support for originating, funding, servicing and collecting accounts as well as providing for extensive reporting. It uses Mountain View, Calif.-based Neuron Data Inc.'s Elements Expert, a rules-based application development environment, to store and manage the business logic.

Using the Neuron Data tool allows Norwest a degree of configurability it never had, Johnston says. "Before, making the most elementary change of a moderately complex business rule—when, for example, a finance rate calculation needs to be modified because of a policy change—could take from 100 to 350 analyst hours. Using the business rules engine, the same effort is reduced to literally minutes."

⊖ BURIED RULES

Whether a business's Rules are in Cobol or C++, they're likely to have varied histories, says UPS's Yanchek. Some originated in response to forces outside the company—such as to ensure compliance with environmental rules or government wage and

Rule# 743: To be shipped, a package must have two addresses. It must

The Standards Issue

ONE OBSTACLE TO THE ESTABLISHMENT OF BUSINESS RULES AS AN enterprisewide methodology is the lack of a standard for the recording and storage of rules. Practitioners and vendors are discussing a standards agreement, but so far discussing is all they're doing.

Eric Kintzer, vice president and chief technology officer at Mountain View, Calif.-based Neuron Data Inc., which makes Business Rule servers for customer relationship management, argues that this lack of standards isn't and shouldn't be a hindrance to undertaking specific projects today. It's an issue that just doesn't come up, he says.

But it will come up as the vision of Business Rules as exchangeable components spreads. CIOs, remembering earlier problems with proprietary technologies like ActiveX and various database formats, will likely hesitate to commit to enterprisewide rules repositories using a nonstandard format.

—A.S. Kay

hour regulations. Others define the specifics of how a particular company does business. "Those business rules," Yancheck adds, "come about from marketing strategies or best practices or business policies or standards or directives." A UPS rule, for example, is its requirement that in order to ship a package it must have two addresses, for both pickup and delivery, and it must know whether the shipment is hazardous.

"If I was sitting across from someone and talking about the business and its rules," Yancheck says, "I would extract three Business Rules right there": a package must have a destination address, it must have an originating address, and the shipper may need to disclose the contents of the package.

But most rules are neither obvious nor accessible. "Rules are buried," says Barbara von Halle, an acknowledged guru of Business Rules. The founder of Knowledge Partners Inc., a consultancy based in Mendham, N.J., von Halle is playing a role in publicizing this new approach not unlike that played by Michael Hammer more than five years ago in the then-new area of business-process reengineering. Von Halle explains that when the rules developed over time are hidden from view inside various application processes, they cannot easily be examined to ensure that business operations are internally consistent and, more important, that they match the enterprise's current goals. And rules buried in procedural code cannot be changed quickly—a real problem when the rapid realignment of a product or service is the key to continued competitiveness.

⦿ USING THE RULES

The Holy Grail of the Business Rules approach is to have a company's rules codified and stored in a way that allows them to be managed without IS intervention. A company's business units would be able to modify the rules quickly, and the IT staff would be freed up for other projects.

It hasn't happened yet, but some companies are giving it a shot. Blue Cross and Blue Shield of North Carolina, headquartered in Chapel Hill, for example, partnered with Platinum Technology Inc. to develop a rules-based automated underwriting system that it rolled out in September 1997 after only a six-month development cycle.

The system, Amus (automated medical underwriting system), developed using Platinum's Aion rules-based and object-oriented development tool, evaluates applicant eligibility and medical risk by automatically applying underwriting rules rather than relying on an underwriter's evaluation of the application. According to John Friesen, vice president of actuarial and underwriting services at BCBSNC, building Amus involved converting the underwriting logic that usually resides in the medically trained underwriter's head into stored rules logic. In operation, the system follows the rules to assign debits in response to the codes representing the applicant's condition; those debits translate into a rate.

Friesen reports that Amus now handles more than 80 percent of new applications, cutting average processing time from days to minutes. With the new system in place, eight

underwriter positions were eliminated—five totally, and three replaced with underwriting processors. And since the underwriting rules are now explicitly stated in English and stored separately, the company is training three staffers to change the rules when necessary—eliminating the need to call on IS.

"Humans come up with variant responses, but machines come up with the same answer every time, and it's right," says Friesen. Because of that predictability, the real payback on the new underwriting system, he notes, was that by reducing its error rate the company saved about 1 percent of its premium revenues—a sum that he says runs well into the millions of dollars.

Another, smaller operation that chose a Rules-based technology was PrimeOne Tele-TV, a San Ramon, Calif.-based provider of line-of-sight wireless digital television service. Terison Gregory, PrimeOne's director of decision support applications, was looking for a way to quickly develop a call center application that would allow customer service representatives to determine service availability based on the details of a caller's location. The solution he found was Vision Software Tools Inc.'s Jade package, which includes a Rules repository, a business logic server and a Rules-based application development tool, Developer Studio, which he reports allowed him to implement his call center within three months.

"We have had some changes to the core business rules that determine how we service the customer," says Gregory. "For example, how changing the power on our transmitter

Rules buried in procedural code cannot be changed quickly—a real problem when rapid realignment is the key to competitiveness.

might affect different zones, or offering customers the option of paying bills in person and so having to determine the closest payment location to a given address." By having the rules explicit, "We've been able to effectively implement those [changes] with very little time to make them happen."

Gregory adds that moving to the new application has helped his budget. His shop now requires the equivalent of only one employee to maintain it. The skills Gregory needs now are more in the area of business analysis rather than programming. Once the details of the project needs are clear, he says, the tool will generate the executable. But Gregory notes that this small development team remains on the IT side of the line. "With the new tool, it's definitely less than it was, but we're not ready for end-user maintenance yet," he says.

⦿ THE RULES PAYOFF

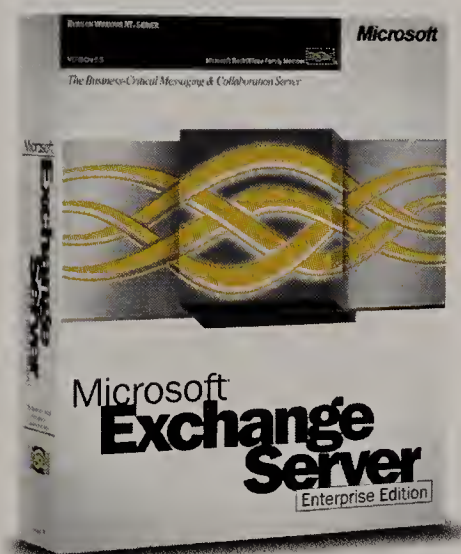
Some Business Rule theorists argue that a company ought to unearth its rules enterprisewide—a project somewhat like the one underway at Basking Ridge, N.J.-based AT&T

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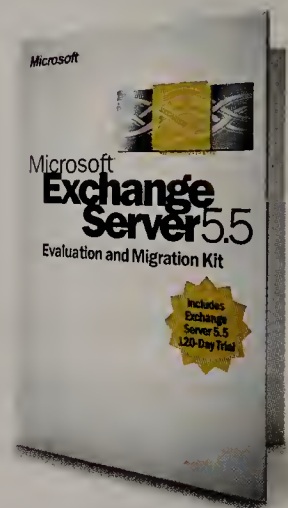
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Consumer Markets Division, whose directors meet regularly to clarify and codify business rules. But given the likely cost and the newness of this approach, few companies are likely to allocate resources for such an effort without compelling evidence from within their companies, or at least their industries, that the bottom line will benefit.

As a result, most Business Rules practitioners today espouse a project-oriented approach. "You need to look for practical results—something that will benefit the enterprise," says Marvin Brander, a senior member of the division's technical staff. AT&T's drivers, as Brander describes them, involve a search for greater efficiency in carrying out projects by bringing both business unit and IT personnel into a redefined and restructured requirements process.

Brander says AT&T has already realized some direct benefits early in its involvement with Business Rules by being able to consolidate business processes and retire one marketing segment's decision-support system. But what strikes Brander most strongly at this point is the way in which this approach has generated a shared clarity about business processes.

⊙ A USER'S PLEA FOR RULES

UPS's Yancheck acknowledges that incorporating business rules into project development can increase the cost of the requirements portion of the process. But he argues that what's actually involved is moving costs laterally.

"Capturing rules has been done all the time. Years ago we would put the rules in code. In the detail design process we'd say, for example, that the shipping number must be numerical and be valid. Now I have to ask upfront, 'What rules do you have about accounts?' So we've transported some of the time and cost from the detail side to the business requirements process."

At the Numeric Database Technology division of Reuters Information Services (Canada) Ltd. in Toronto, Catherine Lathwell, a senior programmer and analyst in the database development group, argues that a Business Rules approach keeps a company's development efforts efficient by ensuring that they conform to business objectives. Her unit recently used a Business Rules approach to break a logjam so that it could

⊙ SELLING THE RULES

Gladys Lam and Ronald Ross, principals at Houston-based Business Rule Solutions Inc., suggest that Business Rules will proceed along two parallel fronts: The front-end approach of using the requirements process to identify or define Business Rules, and the development of increasingly sophisticated business rules engines and other tools to store and manage the rules so harvested.

The state of the art in Business Rules technology today is the rules-based application development environment. USoft, located in Naarden, Netherlands, describes its Developer as a set of tools that gives users the ability to define, capture and store business rules in a single repository, with no further programming required to process those rules or call them for use. Once the rules are captured, Developer generates applications customized to the business function as needed. Greensboro, N.C.-based Burlington Klopman Fabrics, for example, used Developer to re-architect large portions of its IT infrastructure by extracting rules, validating them, storing them centrally and then generating applications far more quickly than had been possible under its legacy architecture.

Vendors acknowledge there is work yet to be done in growing both the tools and the marketplace to support a corporate Business Rules approach. Eric Kintzer, vice president and chief technology officer at Neuron Data, says, "We have customers who occasionally say, 'We need a massive enterprisewide rules repository.' Conceptually that makes sense, but practically, no one can afford that right now."

Today's business rules tools marketplace awaits two key developmental marking points: the entry of a major vendor that will validate the Business Rules approach by incorporating rules tools into application development or enterprise management suites and the squashing of the budget-devouring millennium bug.

Today's Business Rules marketplace awaits two key developments: the entry of a major vendor and the squashing of the millennium bug.

deliver a large project to market. The unit's part of the project involved linking two large databases on different platforms to allow clients to toggle between applications. Creating a set of rules to describe and guide user behavior clarified for developers what had to be done to complete the project, she says, ending a period of continuous disagreements.

Ultimately, Lathwell would like to have a central repository where Business Rules are stored and managed. For the moment, though, the company is devoting its energy to trying to forge closer connections between what a marketing person wants and the actual choices developers make.

The failure to implement Business Rules, Lathwell says, inevitably carries a cost. That's why the Business Rules approach has support from Reuters management. "Our main purpose is to focus development on the business. We think Business Rules will do that," says Lathwell. "Developers have to say, 'I'm making this tactical change because it's associated with this business objective.' That's so simple, but it doesn't happen. By the time something is on the developer's desk, he or she doesn't have a clue what the business case is. Our goal is to tie the two closer together—to make sure the priority calls are right, make sure the development that is happening has a business reason.

"It sounds simple," she repeats, "but it doesn't necessarily happen." **CIO**

Alan S. Kay covers business and consumer technology from San Francisco. He can be reached at ask@well.com.

The



Domino's Pizza Vice President
Jim Krasner is confident in his IS
department's ability to modify
his company's core ERP software.

Ties THAT BOLT

There's no escaping it. You need bolt-ons so that your ERP software can share data with legacy and other systems. Here are four strategies for making integration work.

BY DEREK SLATER

Let's say you've chosen your enterprise resource planning (ERP) package with the utmost care. You've done the cross-functional requirement planning teams, the meticulous change management process, the whole shebang. Perhaps you've even navigated the initial integration shoals with something akin to grace, bolting on your demand forecasting software, the corporate human resources intranet and, of course, your specialized systems for tax planning, bar coding and shop floor control. Time for a breather? Ha!

Now it's time for your ERP vendor to come out with a new version that "basically blows away all the interfaces" to your bolted-on applications, says Bruce Richardson, vice president of research strategy at AMR Research Inc. in Boston. "It's enough to make everybody go to the top of the nearest tall building and either shout or just jump."

Reader ROI

READ THIS STORY TO LEARN

- Strategies for connecting ERP and bolt-on applications
- How to minimize integration risk for future upgrades
- How others organize work teams to support bolt-on integration
- The state of enterprise application integration tools

This is the third article in a continuing series on enterprise resource planning. See "An ERP Package for You...and You...and You...and Even You" (*CIO* Section 1, Feb. 15, 1999) and "Wanted: ERPeople Skills" (*CIO* Section 1, March 1, 1999). For even more on ERP, visit *CIO's* ERP/Supply Chain Research Center at www.cio.com/forums/erp.

As ambitious and all-encompassing as ERP may be, the system won't run the company by itself. Inevitably, other software must be wired in to handle additional business functions, particularly industry-specific ones. And those other applications, often called bolt-ons, haven't always been trained to communicate with ERP packages. The process of connecting the ERP system to the bolt-ons into one harmonious whole can be quite complex. It can involve conversion of data formats, brokering of messages, writing of procedure calls and other tedious technical arcana. Fortunately, there are basic procedures and project management disciplines plus a growing number of software tools that can ease the initial burden of bolting on and also reduce the risk of living out Richardson's upgrade nightmare scenario a few months or years down the road.

ERP implementors have a lot of variables to consider as they embark on the bolt-on process. Four organizations offer glimpses into their integration experience, replete with the lessons they learned.

Relying on Partnerships

JEFFERSON HEALTH SYSTEM
Radnor, Pa.

Hal Augustine, CIO of Jefferson Health System, is in the throes of managing a gradual rollout of PeopleSoft Inc.'s ERP software at

Jefferson's five member networks, which comprise 14 hospitals plus primary-care and specialist practices, rehabilitation centers and other health-care institutions. Jefferson was created just a few years ago, so the various institutions have quite an array of platforms and programs that need to plug into PeopleSoft—an IT version of "the backbone's connected to the head bone."

To further complicate things, there is no top-down, mandated timetable for Jefferson's member organizations to move onto the core ERP platform. (Jefferson's

supply utilization and time and attendance data) for nursing—that both exchange data with PeopleSoft. In this case, the bolt-on vendor is doing the interface work: Per-Sé has an alliance with PeopleSoft.

According to AMR's Richardson, that's a common strategy for ensuring bolt-on success: Choose companies that are partnered with your ERP vendor. "If you polled very large companies choosing bolt-ons, a large chunk will say they took 'whatever has been endorsed by my ERP vendor,'" Richardson says. Of

**"IF YOU POLLED VERY LARGE COMPANIES
CHOOSING BOLT-ONS, A LARGE CHUNK WILL SAY
THEY TOOK 'WHATEVER HAS BEEN ENDORSED BY
MY ERP VENDOR.'"**

**—BRUCE RICHARDSON, V.P. OF RESEARCH STRATEGY,
AMR RESEARCH**

Main Line Health network, the first, is expected to be done implementing the system by July 1999.) However, with an eye toward running all of Jefferson on the PeopleSoft system, a team composed of representatives from administration, finance, HR, materials management and IS from the member organizations has agreed on definitions for a common health-care data model, such as what a

patient's record must include. This will provide the basis for making implementation easier across the rest of the system and supporting integration efforts now and in the future.

Even so, Augustine says he doesn't have a standard solution for interfacing. For example, Jefferson's bolt-on portfolio includes two applications from Per-Sé Technologies Inc.—an operating room scheduling system and a resource scheduling system (for example,

course, the wise CIO will look beyond the press release to make sure there is some actual shared development between the vendors, not just a joint marketing effort.

Jefferson also is using bolt-ons where the vendor is not doing the integration work, such as the link between Jefferson's specialized patient accounting system and PeopleSoft's general ledger module. The Main Line implementation team is hand-writing the connections using integration tools supplied by PeopleSoft. That brings Augustine to another element of the integration process: Testing.

The Main Line team checks its own work by writing detailed test scripts. "We do unit testing and then test all the applications in concert," says Augustine. "We exchange test files with all our third parties," which includes banks and credit unions doing direct deposit, payment identifications and check reconciliation. Users within Jefferson take part in the testing process as well. Third parties are receptive to this type of exercise, says Augustine. "The banks and benefits folks are used to doing this in the course of normal software upgrades, and for other vendors as well it's a normal part of a business relationship," he says.

● Most Common Bolt-On Areas

Other solutions implemented as part of ERP program

Electronic Data Interchange	21%
Distribution/Warehouse	18%
Data Warehousing	17%
Human Resources	16%
Tax	16%
Bar Coding	15%
Sales Automation	13%
Planning and Scheduling	11%
Transportation	11%

Source: Deloitte Consulting LLC. Survey of 62 Fortune 500 companies.

Doing It Yourself

DOMINO'S PIZZA INC.

Ann Arbor, Mich.

In Domino's U.S. distribution division another PeopleSoft project supports heavy business process reengineering, particularly in the area of supply chain management. Domino's delivered 338 million pizzas in 1998. To keep the nation in pies, the company manufactures an average of 4.2 million pounds of dough per week in its 18 U.S. distribution centers. A fleet of 160 trucks carries the dough along with other food and paper products to the 4,500 U.S. Domino's franchises.

Many events create an uptick in pizza consumption, according to Jim Krasner, vice president of supply chain management. Some are obvious (the Super Bowl) and some curious (hurricanes—apparently customers don't mind jeopardizing the health of the delivery drivers). Domino's has no cutoff time for ordering supplies, so a store can call and adjust its order even after the truck has rolled away from the distribution center.

Forecasting software from Prescient Systems Inc. helps anticipate demand. Another application from Manugistics Inc. schedules and routes the delivery trucks, while on-board computer systems feed data into a time-and-attendance system from Kronos Inc., which in turn connects to the PeopleSoft human resources module. Domino's also uses extensive data warehousing and performs some data mining with tools from Cognos Inc. and Hyperion Solutions Corp. in an effort to anticipate, rather than react to, its market.

"We're trying to shift the way we manage our business, from an entrepreneurial, seat-of-the-pants way to a more information-based way," says Krasner.

Domino's was already using some of these and other applications before it started its ERP rollout. It found that existing applications frequently required data fields that PeopleSoft didn't have—or vice versa. For instance, Domino's routing system for its trucks tells the drivers which stores to visit and in what order. The PeopleSoft ERP system didn't have a data field for the delivery stop sequence, but it needed to relay that information to the warehousing system so that it could tell the loaders what to put in the trucks

Proteam.com CIO Dominic DiMascia regards his EAI middleware, not the ERP software, as the core of his company's IT systems.

and in what order. To make all the pieces work together, Domino's decided to take the relatively drastic step of modifying the core PeopleSoft software to include these fields.

Domino's did not want to toss out its existing application portfolio and was confident in the collective integration experience of its staff, so the company's IS team in many cases is building one-to-one interfaces between its ERP system and its bolt-ons. Instead of partnering with its vendor, Domino's is banking on its own disciplined, well-documented development processes to avoid the jump-off-the-building scenario. "If you keep control over the developers and you know what's been done, when you need to upgrade it's not that tough," Krasner says.

Another important tip: "I would start the process of both integration and data conversion very early," he notes. Domino's built a separate team to address those spe-



**DOMINO'S FOUND THAT EXISTING APPLICATIONS
FREQUENTLY REQUIRED DATA FIELDS THAT
PEOPLESOFT DIDN'T HAVE—OR VICE VERSA.**

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cific chores from the get-go of its PeopleSoft implementation in late 1997. "There's a lot you can do in advance in terms of figuring out what you have and what you don't, what isn't in the right format," he says. The team still found bugs to fix and features to add once the project actually started rolling out, but because they were in the early stages of the implementation, Krasner says there was plenty of time to clean up.

Tooling Around with EAI

PROTEAM.COM INC.
Secaucus, N.J.

Enterprise application integration (EAI) tools are an emerging class of software that automate much of the data connection and conversion process for bolt-ons. (EAI vendors include Oberon Software Inc., Extricity Software Inc. and CrossWorlds Software Inc.) One enthusiastic EAI user is Dominic DiMascia, CIO of Proteam.com (formerly Genesis Direct), which produces direct marketing catalogs such as *Competitive Edge Golf* and *Soccer Madness*. By targeting consumer niches, the 4-year-old Proteam.com has grown into a \$400 million company (though it recently sold off a number of non-sports-related titles).

The central financial system for Proteam.com is Lawson Software running on an HP 9000 Unix server. A slew of systems from other vendors plug in, including a mail-ordering and cataloging system from Smith Gardner & Associates Inc., a warehouse management system from Manhattan Associates Inc., a light manufacturing shop floor control system (Proteam.com makes neither golf clubs nor soccer equipment, but it does personalize various products through engraving or custom sewing), inventory forecasting software, a materials handling system for the compa-

ny's distribution center, and electronic commerce software from Interworld. The webbing between these products is what DiMascia dubs his Data Train (for transaction routing and integration network), which is built around DataGate, an EAI product from Software Technologies Corp. (STC). Each application has an interface to the EAI software, which routes all data in appropriate format to other apps as necessary. In a sense, DiMascia regards the middleware—not the business applications—as being the core of his company's IT systems.

DiMascia chose the EAI route for several reasons. For starters, EAI products are built specifically to integrate with other products, so linking to them is not terribly difficult. Second, DiMascia says, "If I have to replace a given application, I can do that with as little impact on the other applications as possible." Because Proteam.com is growing rapidly, flexibility in the application portfolio is important. Further,

the EAI product can reformat and manipulate data as it passes the information from one system to another or distribute parts of a data string to different target applications. For example, when a shipping confirmation comes into the system, DataGate sends one record to the catalog management system for billing and customer service purposes and another copy of the data to the financial management system.

While DiMascia is pleased with his company's experience with EAI, there are a few caveats. Most EAI products on the market represent a relatively new technology and as such they should be subjected to careful scrutiny to make sure they will handle integration with each business's application portfolio. The software vendors themselves in many cases are also quite new and may not pass the

PC Connection CIO John Bomba tries to rely on his vendors to handle integration tasks wherever possible.





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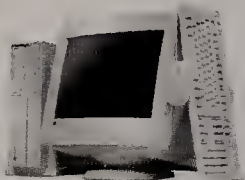
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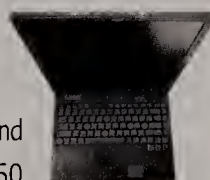
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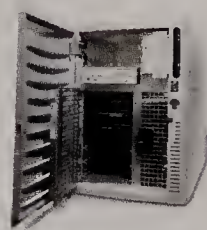
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"big installed base" or "financially stable" criteria that are important to many CIOs. This was initially a concern for DiMascia, and one reason he selected DataGate was that it was an older product that had evolved over time from STC's original electronic data interchange software offerings.

Getting Your People Organized

PC CONNECTION INC.
Merrimack, N.H.

At PC Connection, a mail-order vendor of hardware and software, the ERP system has a variety of interfaces that "touch on virtually every other program" down to the telephone switches, says John Bomba, CIO of the \$732 million corporation. The company rolled out J.D. Edwards & Co.'s World ERP software as its core system in July 1998. PC Connection uses many of the ERP modules: accounts payable, accounts receivable, general

ledger, inventory management, advanced warehouse management and sales order management.

One system that is crucial for PC Connection is a mail-order specific front-end program that facilitates rapid order and customer data entry by customer service representatives in the phone center. The company also uses a third-party bar-coding solution in the distribution warehouse, a data repository for corporate reporting, a telephony system and tight links to the company Web site for electronic commerce.

Connecting all these pieces is not just a technical issue. One of the keys to success lies in having the right people organized in the right way to make everything come together. To that end, PC Connection brought in a consultant to oversee the ERP implementation and integration project: Dennis Pyburn, who prior to Bomba's arrival had served as interim IS director at the company. Pyburn's familiarity with the company's corporate business mod-

els and functions greased the project's wheels.

In organizing the rest of the department, PC Connection does not have a specific group focused on integration to maintain the links and keep up with upgrades. Instead, Bomba says, the department is organized along platform lines. Bomba's group selected the J.D. Edwards software in part because it runs on the IBM AS/400 platform with which PC Connection's staff had significant experience. In this way, the company believes it is minimizing the project's technical risk. The bar-coding bolt-on also ran on the AS/400. This setup makes it simple for the AS/400 platform group in IS to maintain responsibility for some interfaces, while other groups handle interfaces that connect to systems on the platforms they tend—again curtailing the disruption of the ERP implementation process. A separate database group keeps an eye on data integrity across all platforms and all integration links.

PC Connection also strove to select "tried and true, financially stable" bolt-on vendors that already had big installed bases for their products, says Bomba. PC Connection chose a business partner of J.D. Edwards for a bar-code solution and upgraded its telephony application to popular products named CallPro and CallPath. Similar to Jefferson Health System, PC Connection tries to rely on the vendors to handle integration where possible.

"The closer you stay to prepackaged solutions, the better positioned you are to take advantage of changes," Bomba says. The exception is the mail-order front-end package, which is custom developed by PC Connection to match its most critical business functions more closely. "On average I would say we did a good job of selecting our vendors. They stepped up whenever there was an issue to address, and some continue to work with us today." **CIO**

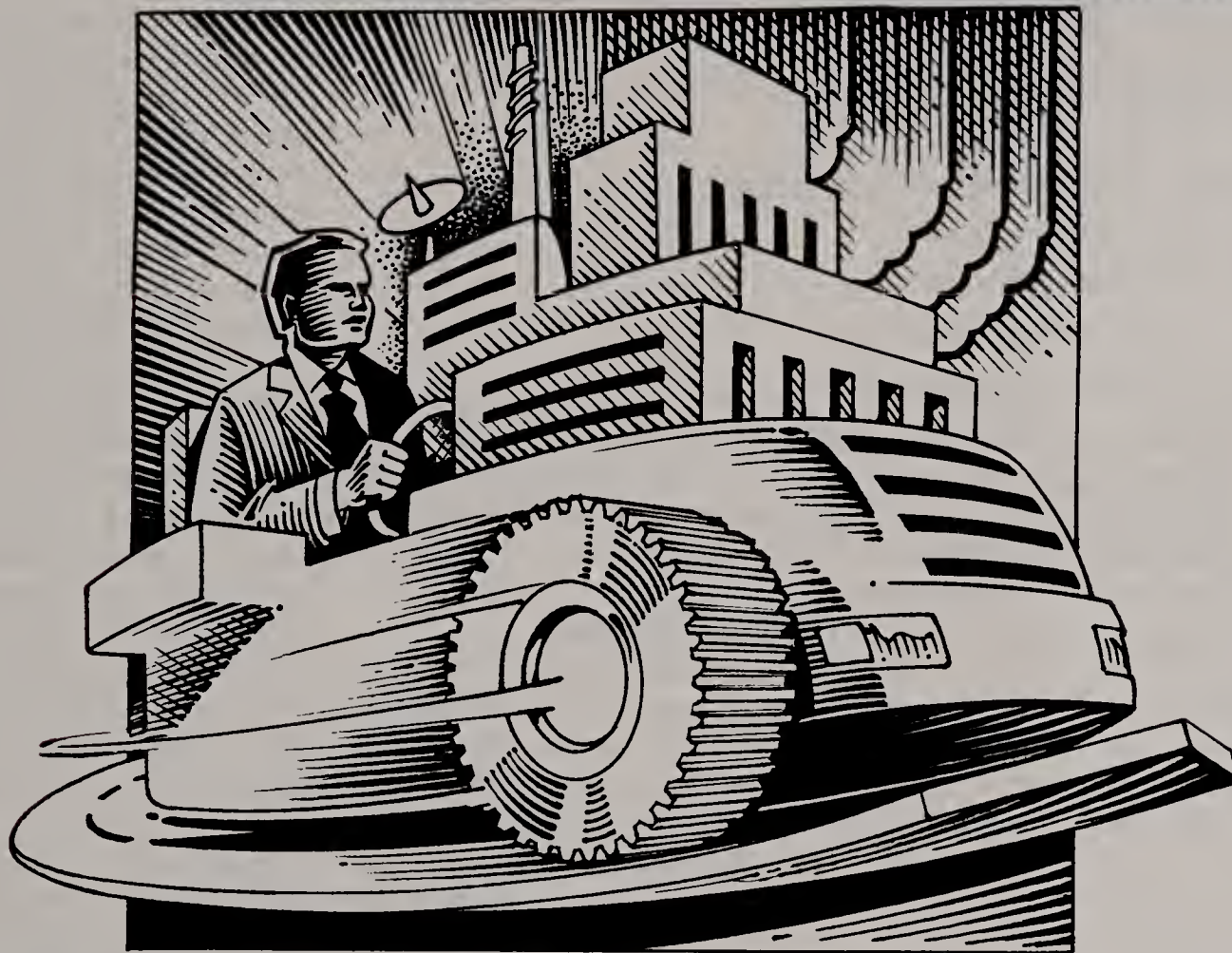
Lessons Learned

Veterans offer tips for keeping bolt-on integration simpler and more manageable

- **Go "vanilla" on your ERP implementation, that is, don't get tricky.**
Modifying the core software makes upgrades problematic. The trade-off: Vanilla may not match key business processes.
- **Stay up-to-date on all applications.** New releases or patches for one piece of the puzzle probably won't be engineered to work with your 6-year-old database or inventory management program. The trade-off: Money (as always). Keeping up-to-date can be expensive.
- **Select bolt-ons from "official business partners" of your primary ERP vendor.** Ask questions to make sure they are working together, not just marketing together.
- **Incessantly prod both the ERP vendors and the bolt-on vendors to build integration into their products.**
- **Don't abandon the basic disciplines of implementing ERP.** Keep those cross-functional teams together and test integration links like crazy.
- **Consider new EAI tools but be aware of the risks.**

Senior Writer Derek Slater can be reached at dslater@cio.com.

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BY ROB ENDERLE

CHANGE IS THE ONLY THING you can depend on in this life, and nothing in the IT world appears on the verge of a bigger change than desktop technology. This impending transformation will likely bring about a shift in industry power and influence away from Microsoft Corp. and Intel Corp. and toward companies that provide connectivity or content. It will alter our offices and the way we work by replacing the large, application-crammed, unreliable PC with a simple full-function device that puts the complexity where it belongs—in the back office, not on the desktop.

Why is this happening, and why is it happening now? The forces driving the change are coming from several quarters, and they are all converging on the desktop.

The Roots of Change

For years customers have been asking for an appliance-like experience from their desktop equipment. You plug it in, turn it on and it works. End of story. What's amazing is that this has been the one thing that vendors heretofore have been unable to deliver. But the market is moving in that direction, and it will get there with or without the help of today's vendors.

This change isn't taking place only on traditional PC platforms but on alternative platforms as well. The Jupiter-class CE-based personal computer from Packard Bell NEC Inc., for example, is a prototype of what the desktop of the future may hold. Looking much like a laptop, it provides 10 hours of battery life, instant on and off and, eventually, when coupled to a multiuser server, a near-PC experience. These devices already can display presentations, handle e-mail, do light document creation and manage contacts and calendars reasonably well. Future generations are likely to replace most laptop computers with a product that is closer to what users want, yet is completely different from today's machines—an appliance that virtually never crashes at the desktop.

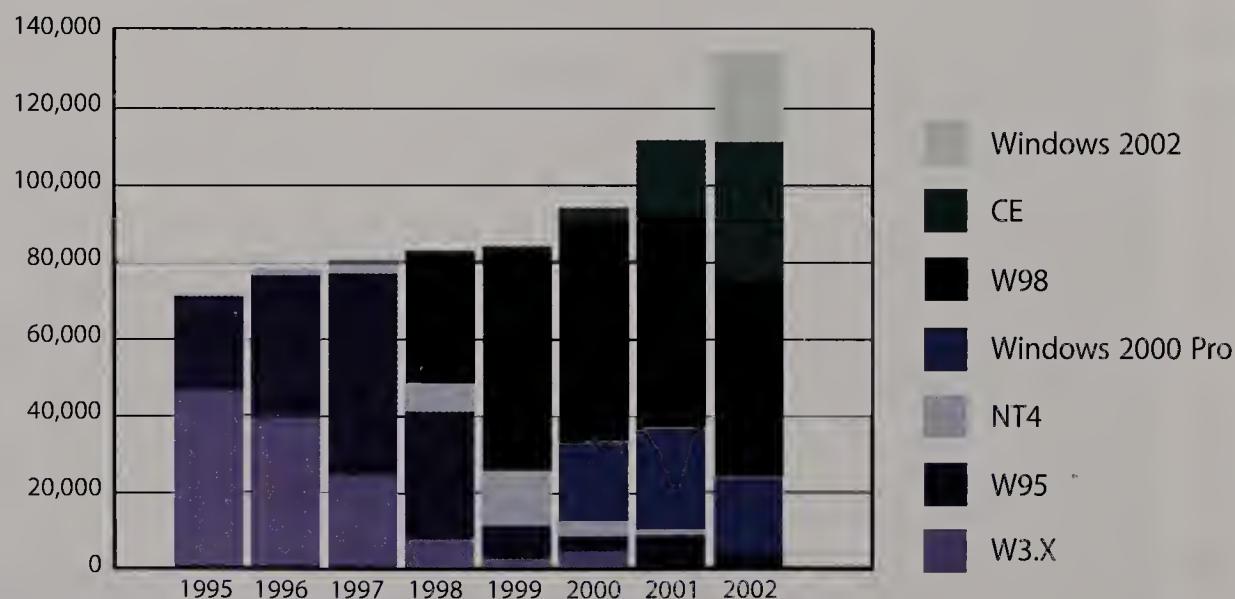
What's taken so long? Some vendors simply have had selective hearing about their customers' wishes, but more fundamentally, habit is to blame. PC companies built their initial machines on a

standard based on the hobbyist's box from the early 1980s. It took a few companies (that is, Oracle Corp. and Sun Microsystems Inc.) breaking with that standard to uncover some of the real cravings of users. If either Oracle or Sun had truly understood what it was they were trying to provide when they ventured out with the network computer concept, we might already be dealing with a whole different desktop experience—and a new set

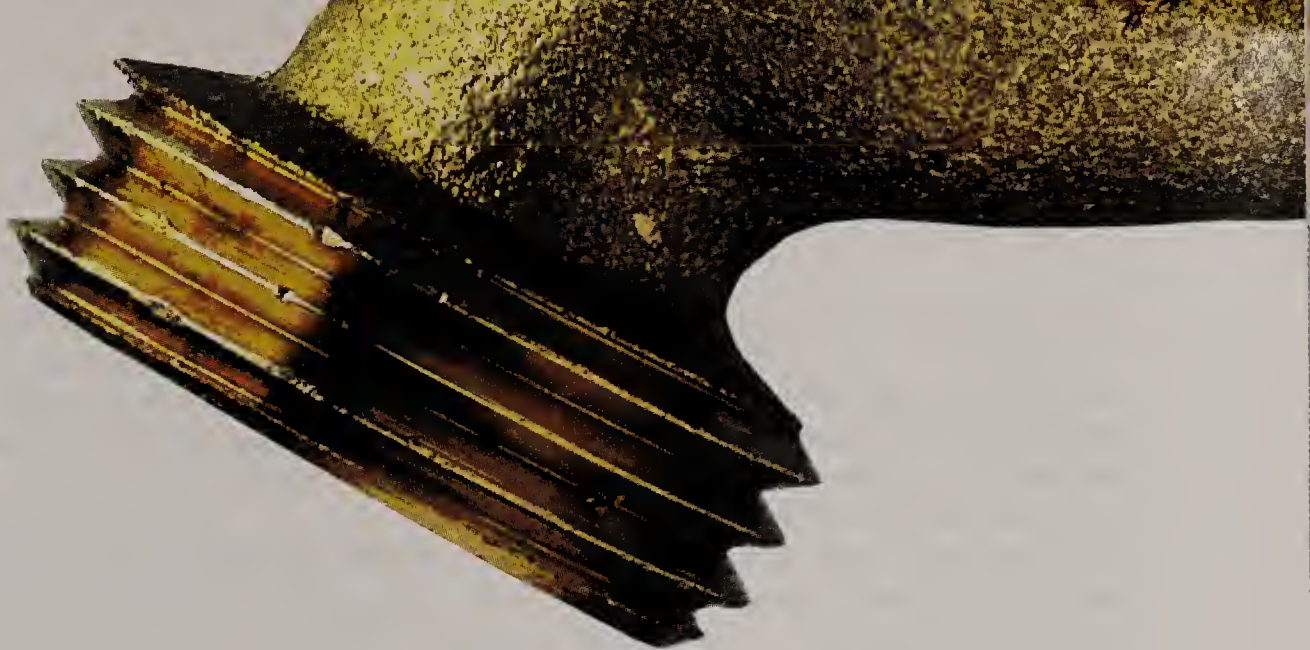
Windows Operating System Forecast

What we have been—and will be—seeing on the desktop

(Shipments, 000s)



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Giga View

of vendors to provide it. Those two companies, however, being essentially anti-PC, had trouble creating a PC replacement. Yet despite their failures, the concept of network computing resonated and validated the Windows terminal, which has the advantages of a network computer and runs Windows applications.

Another portent of change is the *U.S. v. Microsoft Corp.* trial. Watching it is almost as compelling for some as the O.J. Simpson trial a few years ago. The antitrust case is already having a significant impact on the public's perception of the consumer computer business as

technology shift of unprecedented size and scope. The year 2000 problem is likely to generate corrective action next year as firms attempt to recover from total system shutdowns. IT managers will have to risk radical approaches to return their companies to operation, and that may well mean a forced migration to a new platform.

We expect companies will slow purchases dramatically in the last half of 1999 and the first half of 2000 as they attempt to correct year 2000 exposures. This will create a unique opportunity for suppliers of alternative solutions to replace the existing technology base

environments are currently being sold into specialized areas and not positioned as a general-use desktop. This is beginning to change with the iMac, and we expect to include the Mac OS again in next year's projection.)

Intel's next refresh of Pentium II technology has already been released as the Pentium III and will run best on Windows 2000. In fact, the performance increase is anticipated to be great enough that current Pentium II systems will enjoy a shorter time in service as a result. That is, anyone buying hardware for Windows 2000 will want Pentium III to go with it and will probably dump the old Pentium II "before its time."

The Pentium III will be followed shortly by a chipset code-named Coppermine, which will make most existing mobile equipment obsolete by providing a level of performance unmatched in today's portable equipment.

As for storage, it wasn't long ago that we thought 10 megabytes was more than we would ever need. Now we can buy 6.5 gigabytes for under \$150. We can make our own CDs today, our own DVDs tomorrow and a new technology, solid-state optical drives from companies like Ioptics Inc., is expected to enter the market soon, changing the entire storage landscape. Given the concurrent shift from applications to servers, the expected desktop requirements for storage appear about to decline for the first time ever.

The Shapes to Come

Displays are changing, with 15-inch flat panels—equivalent to 17-inch cathode ray tube (CRT) monitors—dropping below \$1,000. These displays offer flicker-free performance, virtually no radiation, a life cycle near twice what a CRT provides and a return of desktop real-estate long wasted by today's over-size CRTs. With technological improvements, cost reductions and performance advantages, flat panel displays are expected to replace CRTs in the market within two years.

The physiques of other devices will change as well. Apple delivered a wake-up call to the market with iMac, and Intel has responded with a cutting edge design of its own. Board manufacturers

The expected desktop requirements for storage appear about to decline for the first time ever.

the players are being portrayed in a light that is hardly flattering for any of them. Both Microsoft and Intel Corp. will likely see their reputations suffer, and their ability to direct change will likely suffer as well.

Just as legal action against IBM Corp. in the 1960s spurred the move to PCs in the 1980s, the attack on Intel and Microsoft will enable change. It may produce a windfall for overseas vendors or emerging companies, or it could simply stall the market. But one result is sure within a few years: a metamorphosis in what we have on our desktop as well as who provides it.

The most likely move right now appears to be to Linux (a freeware follow-on to Unix developed by Unix core developers) and dedicated hardware. Whether we are talking about single-use servers, specialized desktops or both, the opportunity for a hardware vendor to take Linux and create a unique and differentiable offering is stronger than ever before. We believe it likely that at least one vendor will deliver such a system within 12 months. If others follow, this could spell the beginning of Microsoft's decline and the emergence of a new desktop standard.

Besides these pressures, a once-in-a-lifetime event is expected to bring many companies to their knees and force a

and drive change into the market. Meanwhile, IT organizations that have already shifted from a desktop-based to a server-based model will be able to respond to the Y2K threat more quickly, and their highly visible success should further drive the market in that direction.

The Future Inside

Next year will see the launch of a number of technologies that will have a lasting impact on what we work with over the next three to five years.

Windows 2000 (formerly Windows NT), a product that has been long anticipated, finally seems to be within nine months of shipping. But most companies have indicated that they will be unable and unwilling to buy into it until they have completed their year 2000 remediation *and* seen that Windows 2000 is reliable. The chart on Page 66 reflects our current desktop operating system forecast for Windows technology. The growth reflected by Windows CE is a placeholder, and this growth could be taken up by dedicated Linux desktops or even by Apple Computer Inc.'s Macintosh machines should CE fail to meet expectations. (You'll note that we do not reflect Unix or Macintosh market share in this chart; that is because both operating

like MSI Computer Corp. are now moving aggressively to the MicroATX parts that can be used in a number of unique ways. And finally, the age of the

speech recognition software. This allows a user to create a document when a keyboard and mouse are impractical, and foretells a time when

our desktops, into our homes and onto our backs.

To prepare for this change you'll need to reduce the complexity in your shops by eliminating redundant vendors, establishing and enforcing standards and shifting as much as you can of the application load from desktop systems to servers. Create user councils so that emerging needs can be anticipated and met in a timely way while creating a base of users to support and take advantage of technological advances.

Ready or not, change is coming. Take advantage of the opportunities presented to improve your organization's competitive capability, reduce your and your users' aggravation and—since you can't hide from this change—try to enjoy it. **CIO**

Rob Enderle, a vice president and research leader at Giga Information Group Inc., can be reached via e-mail at renderle@gigaweb.com.

Technologies from Dragon Systems and IBM are likely to turn the mouse and keyboard of today into the dinosaurs of tomorrow.

beige PC box is drawing to a close and we are about to see an influx of small, attractive and surprisingly capable personal computers.

User interface is one of the most remarkable arenas for change. Technologies from Dragon Systems Inc. and IBM are likely to turn the mouse and keyboard of today into the dinosaurs of tomorrow. One of the most intriguing replacements for the keyboard is the digital recorder coupled with

we will put on our computers in the morning much the same way we now put on a shirt. In fact, the shirt will *be* the computer.

Arrange for Change

These technologies will all begin to come together in 2002. A weakened Microsoft and Intel will be vulnerable to attack, appliance-like architectures will be reaching maturity, and new machine designs will be moving onto



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Edited by Howard Baldwin

Storage Meets Networking

Faster speeds are no surprise in storage, but this new technology eases data management too

BY JOHN WEBSTER

IF YOU THINK YOUR NETWORK TAKES A POUNDING, CIO Glenn Bonner at Mirage Resorts Inc. would like to set you straight. The massive Mirage Casino and Hotel towering over the Las Vegas strip is a 24/7 rush of gambling and guests. Downtime is a foreign concept for the city as well as the computers. Every time a guest checks in or tries his luck on the slot machines, he generates a network transaction. And that data has to be stored somewhere. But like many CIOs whose data needs outgrow their networks, Bonner took advantage of an increasingly popular technology called a storage area network (SAN). Simply put, it's a set of dedicated storage devices that are linked into their own network and use the fibre-channel storage interface, which takes up where SCSI (small computer system interface) leaves off.

Because it comprises both storage and networking, SAN offers enough bandwidth and speed to eliminate network transaction slowdowns, a key asset when transactional data flows around the clock. "We already saw a conflict between storage needs and transaction needs," says Bonner. "Before implementing a SAN, backing up data took an incredible amount of time, and it impinged on overall network performance. Now we can separate the storage processing from the rest of the network and back up our data without interfering with our transaction needs."

GartnerGroup Inc. predicts that by 2001 more than 80 percent of the Fortune 500 will have a SAN installed. Thanks to insatiable storage appetites, data intensive market segments such as digital video processing latched onto the storage networking idea first, says Robert Gray, research manager for storage systems at International Data Corp. in Framingham, Mass., a sister company to CIO Communications Inc. But he adds that users in virtually all

industries are taking notice. In 1998, according to Gray, users spent about \$560 million on fibre-channel storage arrays for SAN environments. This year he expects that number to triple. IDC says that by 2002 fibre-channel storage arrays will be a \$9.2 billion business, and users will spend an additional \$2 billion to \$3 billion for SANs using other interfaces.

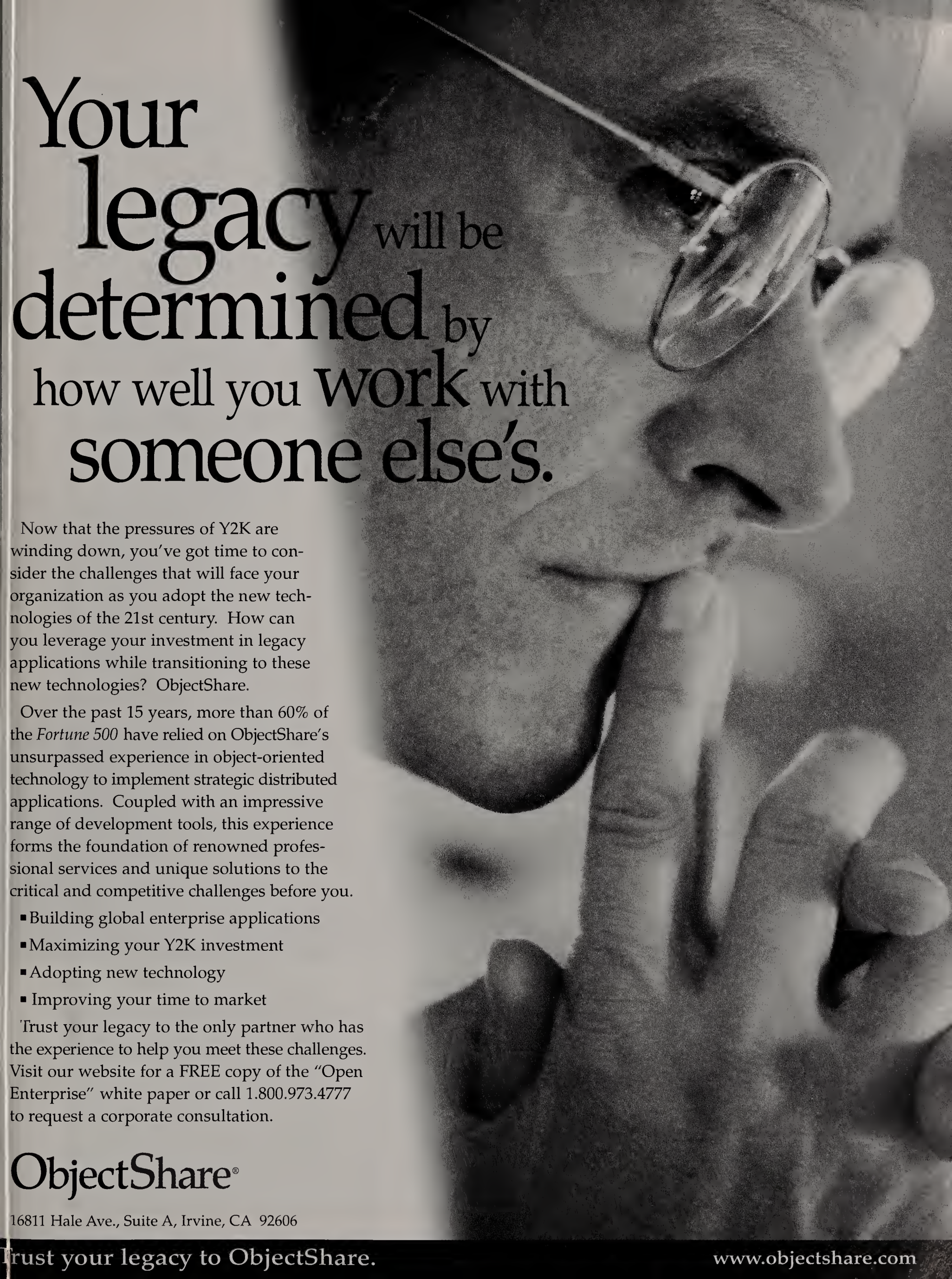
The Ins and Outs of SANs

One of the most amazing upward curves in technology has been the increase in disk drive capacity. But at the same time, new technology was needed to transport data—fre-



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quently in much larger files than the network had contended with before—in and out of the devices. That's how SAN evolved. The fibre-channel data transfer technology supports up to a 100MBps rate over distances of up to 10 kilometers (around six miles), both huge jumps over the maximum speeds and distances supported by the latest SCSI standards. About the name: Fibre-channel technology was originally designed for fiber-optic cabling, but when the International Standards Organization added copper cable support, it adopted the international spelling of *fibre* in an attempt to downplay its strict association with fiber-optics while maintaining the historical link. Fibre channel is now an American National Standards Institute (ANSI) standard.

Storage area networks can comprise any number of storage systems—RAID (redundant array of independent disks), tape backup, CD-ROM libraries or simply a bunch of magnetic disks—linked via fibre channel to one or more servers. Users can access devices over the network's high-speed connections, even simultaneously accessing the same disk at the same time (for different files, of course). By giving data storage its own highway, as it were, users don't have to battle the server for bandwidth.

It sounds simple, but because it borrows so much terminology from networking, the product array can be confusing. From vendors such as 3Com Corp., EMC Corp., Hewlett-Packard Co., Storage Technology Corp., Transoft Networks Inc., Xiotech Corp. and others, you can get chassis with multiple drive bays, switches (which increase bandwidth and add communication paths between servers) and hubs (which route data to multiple users and/or devices). For CIOs like Bonner, SANs solve the connectivity, data access and bandwidth problems associated with SCSI-based server-attached storage while providing dedicated connections between storage devices and applications residing on servers.

The networking analogies are appropriate, because SANs share storage data the same way server application data can be shared across an internetworked

Beat the Backup Blues

Does your blood run cold every time you see a laptop leave the building?

THE BOUNDARIES of what you're responsible for expand every time someone takes a laptop with mission-critical data on the road. As telecommuting and mobile workers become more common, you're being charged with a mission that you may not have had when you started in IT: maintaining the security and reliability of data on laptops (for more on this issue, see "The Road Rage," *CIO* Section 1, Jan. 15, 1999).



MOBILE BACKUP

Several companies have popped up to address the issue of backup for the road warriors in your company. Atrieva Corp., @Backup Corp. and Connected Corp. offer software that lets laptop users upload and download data via the Web. Don't want to outsource this one sliver of your backup responsibilities? Then consider this scenario: Your sales manager's hard drive crashes on a trip to Malaysia. To get her data back, she can wake up one of your staff in the middle of the night, or she can get another laptop equipped with a browser, use her password to get at her data sitting on one of the ABC group listed above and download her presentation without disturbing anyone's sleep.

The problem for a CIO is that PCs and mobile computers play a much bigger role than they did before, laments John L. Puckett, CIO for GTE Internetworking in Cambridge, Mass., and a user of Connected's software internally (another option if you want users to dial into your servers rather than

Connected's). Data is suddenly in the home, the hotel and on the road, "and yet the CIO is responsible for protecting it at all times."

The services provided by these firms are fairly simple. User data is compressed and backup can be done over the Internet using secure encryption. They automatically perform file synchronization and an IT shop can tailor default settings to accommodate different users' needs. Puckett notes that you can maintain multiple versions of information so that you can revert to an older version if necessary, and he suggests cutting a CD-ROM every year for offline backup.

From a cost standpoint, it's a cheap insurance policy. Atrieva charges \$9.99 per month for 100MB of data (\$119.88 for the year) or \$149.99 per year for up to 1GB of data. @Backup charges \$99 per year for 100MB of data, an emergency CD is \$39.95 and a quarterly backup CD is \$33. Connected charges \$20 per month (its server solution costs \$6,000 per server and \$140 per client).

Puckett says that it can even put IT into the position of heroes. When users can get back a file that they thought they lost, he says, "It turns them into our biggest fans."

—Howard Baldwin



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enterprise. Glenn Strachan, vice president and chief information officer at the nonprofit Academy for Educational Development (AED), in Washington, D.C., describes his SAN as a wheel. A Xiotech fibre channel storage array sits at the hub of the wheel, while "spokes" of fibre-channel cabling radiate out to his servers, each dedicated to a specific process. "We can put all our user files and project data on one server and use another server for e-mail, for instance, instead of using a departmental server for both data storage and e-mail," says Strachan. "This way, we don't need to load multiple processes onto one server. This simplifies management because if we want to update an application, we can update one central server instead of eight different servers."

Data Management Takes Center Stage

If you measure your enterprise data storage in terabytes, chances are you're having a hard time keeping track of it all. As your data continues to grow, the question becomes not only where do you store it all, but how do you distribute, manage and back it up, especially without affecting overall network performance? That brings up a nice surprise about SANs: While software to manage a new technology usually shows up as an afterthought, it's already available for most SAN products, handling network file control, mounting and unmounting of drives, basic security and cross-platform use of shared storage on the network. You can also view data stored on multiple devices as if it were centralized.

This simplified data management (which is generally supplied by the specific vendor) is as much a draw as the technology's speed, says Keith Thibodeaux, vice president of network services at Baton Rouge, La.-based United Companies Financial Corp. "The bigger draw is the ease of adding and removing storage on individual servers" with just a few mouse-clicks; Xiotech's software, he says, lets him dynamically allocate storage.

Simpler Backup

SANs offer another advantage. Among your biggest enterprise data management headaches is backup. The process usually causes network service interruptions while information gets moved from local disks on a server to offline drives for safe keeping. But SANs can remedy this painful procedure. Instead of relegating time-consuming data backups to the dead of night or weekends, when network traffic is at a minimum, the speed of fibre-channel-connected storage networks, coupled with SAN management software's capabilities, lets IT personnel back up data almost on the fly, according to the AED's Strachan. The Xiotech software permits him to create an image of any volume or disk and backs it up in real-time,

LEADING

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View Incoming Calls Via PC

THE UNIVERSAL INBOX—IN WHICH PHONE, FAX AND E-MAIL ARE integrated—is one step closer. Tygart Technology Inc. in Fairmont, W.Va., has ambitiously added calendaring into this equation with its **Prism/Look** software. It integrates incoming phone calls, Microsoft Outlook contact management software and corporate databases so that users can know not only who's calling by looking at their PC but can get information in real-time about the callers' accounts and the company's relationship with them. After all, you don't want a new employee asking your biggest client who she is.

The software enables users to dial, answer and transfer calls as well as put callers on hold and set up conference calling. It links the user's desktop to a Microsoft Exchange server for access to corporate information. It runs on the Windows 95, 98 or NT operating systems and requires between 26MB to 46MB of hard disk space and a TAPI-compatible telephone system. Prism/Look costs \$199 per user; volume discounts are available. For more information, call 304 363-6855 or visit www.tygart.com.

File Delivery for Workflow

ONE OF THE PROBLEMS WITH WORKFLOW APPLICATIONS IS that usually at some point in the process you have to ship information outside your company, which means it's no longer under the control of your network. E-mail and the Internet's file transfer protocol may not be the most reliable form of communication; yet if the workflow is mission-critical (and when isn't it?), that step of the process needs to be reliable too. Hilgraeve Inc.'s **DropChute Enterprise**, now

shipping, is designed to integrate smoothly into your workflow applications. You can automate delivery so that users can simply drop files into a designated folder from which the files are transported via secure, encrypted real-time connections between two PCs. According to the Monroe, Mich.-based company, the process also avoids problems with large or corrupted files or garbled e-mail attachments.



DropChute Enterprise incorporates ways to automate what happens to files when they're put into the delivery box; for example, batch files can be executed or separate files can be launched to process the data. Users can exchange files, folders or even data on entire hard drives and ship that data to one or more users. There are two kinds of client applications: DropChute Pro for internal users and DropChute Lite, which can be distributed to clients or external users so that they can exchange information with your company easily.

Prices start at \$1,995 for one DropChute Enterprise server and 10 DropChute Pro clients; site licenses are also available (DropChute Lite is free). The software runs on Windows 95, 98 and NT. For more information, call 734 243-0576 or visit www.hilgraeve.com.



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not just after hours. "Because the volume is going over a fibre-channel connection, and not the Ethernet LAN, we don't have to worry about bandwidth contention," he says.

Even when a server fails, a SAN can drastically reduce the time it takes to make the data available. Because you can dynamically allocate a server's storage space in an array of disks, a quick switch to another drive keeps your users up and running almost without a hitch. United Financial's Thibodeaux says time savings can be measured in hours. "Once when we had a corruption on our Microsoft Exchange server, we didn't want to take time for the traditional backup-and-restore procedure. So we allocated 50GB in the storage array to cover ourselves by creating a new volume and copied the database there. Then we fixed the corruptions and copied it back." Overall, he saved several hours by not having to recover the data from tape and restore it.

Keeping SCSI in the Storage Network

Despite these benefits, you probably don't want to make a wholesale switch to the technology simply because you have too much money invested in existing SCSI storage products. However, SCSI-to-fibre-channel bridges from vendors such as Atto Technology Inc., Chaparral Technologies Inc. and Crossroads Systems Inc. will allow you to make SCSI tape libraries and disk arrays part of the SAN. The data center at Dublin, Ohio-based Online Computer Library Center Inc. houses Worldcat, the world's largest bibliographic database. The center stores 12 terabytes of data attached to an IBM S/390 mainframe and several Tandem systems as well as systems running Unix and Windows NT. "More than half of our recent growth has been on Unix and NT and we wondered how many new tape subsystems we would have to buy," says Jerry Lynch, OCLC's director of operations. "But instead of buying new drives, we can redeploy existing S/390 tape resources to the other platforms. Some are direct SCSI-connected and the rest are connected to a SAN using fibre channel and SCSI-to-fibre bridge technologies."

If you're having trouble managing your data and you're juggling storage devices from multiple vendors—and those devices are scattered around the enterprise—you may be ready for a SAN. Clearly, the centralized configuration, scalability and manageability make SAN technology worth considering, especially when your stored data breaches the multigigabyte level. At long last, say users, the storage portion of a network can be managed with the relative ease of managing a LAN. **CIO**

John Webster is a freelance writer based in Natick, Mass. He can be reached at jwebs@tiac.net.

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Cross-Platform Data Conversion

MOVING DATABASE INFORMATION BETWEEN PLATFORMS, whether for Y2K testing or other work, is no picnic. Princeton, N.J.-based Princeton Softech Inc.'s **Move for Servers** lets users test the process of exchanging data between Oracle databases and IBM DB2 databases running on mainframes using OS/390 or other hardware platforms running the DB2 Universal Database. In subsequent versions, users will be able to test data being converted from Microsoft Corp. SQL Server and Sybase Inc. and Informix Software Inc. databases.

The software supports several conversion functions, including scheduling, loading and so-called relational deletes. For Y2K issues specifically, it handles semantic aging, date interpretation, target dating, global date advancement and other date-related needs. Users can also program it to skip dates and watch for windowing techniques. Server-based pricing starts at \$35,000. For more information, call 609 688-5000 or visit www.moveforservers.com.

Integrating Call Center Support

YOUR CUSTOMERS COME TO YOU LOOKING FOR SUPPORT information from a multitude of places: the Web, your call center, e-mail and your interactive voice response (IVR) system. Good luck trying to integrate all this information so that they can find it quickly. To this end, though, Inference Corp. in Novato, Calif., has upgraded and renamed its CBR (case-based reasoning) software as **k-Commerce Support 4.0** so that customers can access information no matter how they're contacting you—even through call-center-based chat rooms. The product uses Inference's knowledge tools to determine from customer questions exactly what they're looking for.

It has five components. In each case, the knowledge base comes back with additional questions or recommend solutions. The desktop component lets customer service agents enter problems as the customer describes them in everyday language. The Web component lets customers type in requests or questions themselves. The e-mail component lets customers send their questions via e-mail. The IVR component works similarly, using speech recognition and touch-tone input. Finally, a chat-room component lets customers converse with customer service agents, who can access files from the database and route them to the customer.

K-Commerce Support 4.0 runs on Windows 95, 98 and NT and works with databases from Oracle Corp., Sybase Inc. and Informix Software Inc. as well as with Microsoft Corp.'s SQL Server, Raima Corp.'s Raima Database Manager and IBM Corp.'s DB2 databases. Pricing starts at \$1,495 per agent seat for assisted deployment and \$50,000 per server for self-service deployment. For more information, call 415 893-7200 or visit www.inference.com.



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AT AIRBORNE FREIGHT CORP., commonly known as Airborne Express, business success depends on speed. After all, businesses and individuals turn to companies like Airborne Express for fast and efficient air delivery. And with nearly 200,000 calls rolling into its call centers daily, the company must ensure that customers aren't kept waiting.

At the same time, the Seattle-based company operates in a highly competitive environment in which Federal Express, UPS and the U.S. Postal Service are readily available to potential customers. It's easy to see why running the call centers efficiently while controlling costs is critical. And because personnel accounts for about 70 percent of each call center's costs (the rest goes to rent, phone bills, and computer and telephone equipment), it's imperative that the company predict call volume accurately so that the right number of people are scheduled.

In the past, scheduling call center staff was a complicated process that consumed between 8 and 12 hours of a supervisor's time each week. The supervisor would examine historical data from the phone system for the same period during a previous year (for example, the day before Christmas) and use a basic software program based on queuing theories to project staffing needs. The supervisor would then write the schedule manually.

To control costs and serve customers better, in 1991 Airborne Express began consolidating its original 60 call centers into its present 15 regional centers. Managing staff schedules at each center soon became even more difficult. "We noticed that our service levels were not consistent throughout the day," says Gary Reynolds, vice president of customer service. "We needed to maximize

Airborne Freight's Call Center Management System

Vital Statistics:

- **Organization:** Airborne Freight Corp., Seattle
- **Application:** Call center management
- **Technologies:** Blue Pumpkin Software Inc.'s PrimeTime workforce management software running on Pentium-based PCs
- **Scope:** About 30 managers, trainers and technical analysts and 1,350 customer service representatives at 15 call centers
- **Sponsor:** Gary Reynolds, vice president of customer service
- **Objective:** To provide more consistent service, boost customer satisfaction and free supervisors to work with staff
- **Payoff:** Improved service and strengthened planning capabilities without increasing staff

our staffing with existing resources so that we could increase our consistency and customer satisfaction as well as free up managers to work more with customer service representatives on individual calls."

In September 1994 Reynolds' staff began evaluating workforce management software. They chose PrimeTime from Blue Pumpkin Software Inc. in Mountain View, Calif. Following a four-month pilot study at its call center in Tampa, Fla., Airborne Express began training supervisors at centers across the United States. Initially rolled out to five call centers, the software is now used companywide.

Once the historical phone call data is integrated into PrimeTime's database, call center supervisors enter parameters such as the desired service level and the average amount of time spent on each call. PrimeTime then calculates staffing

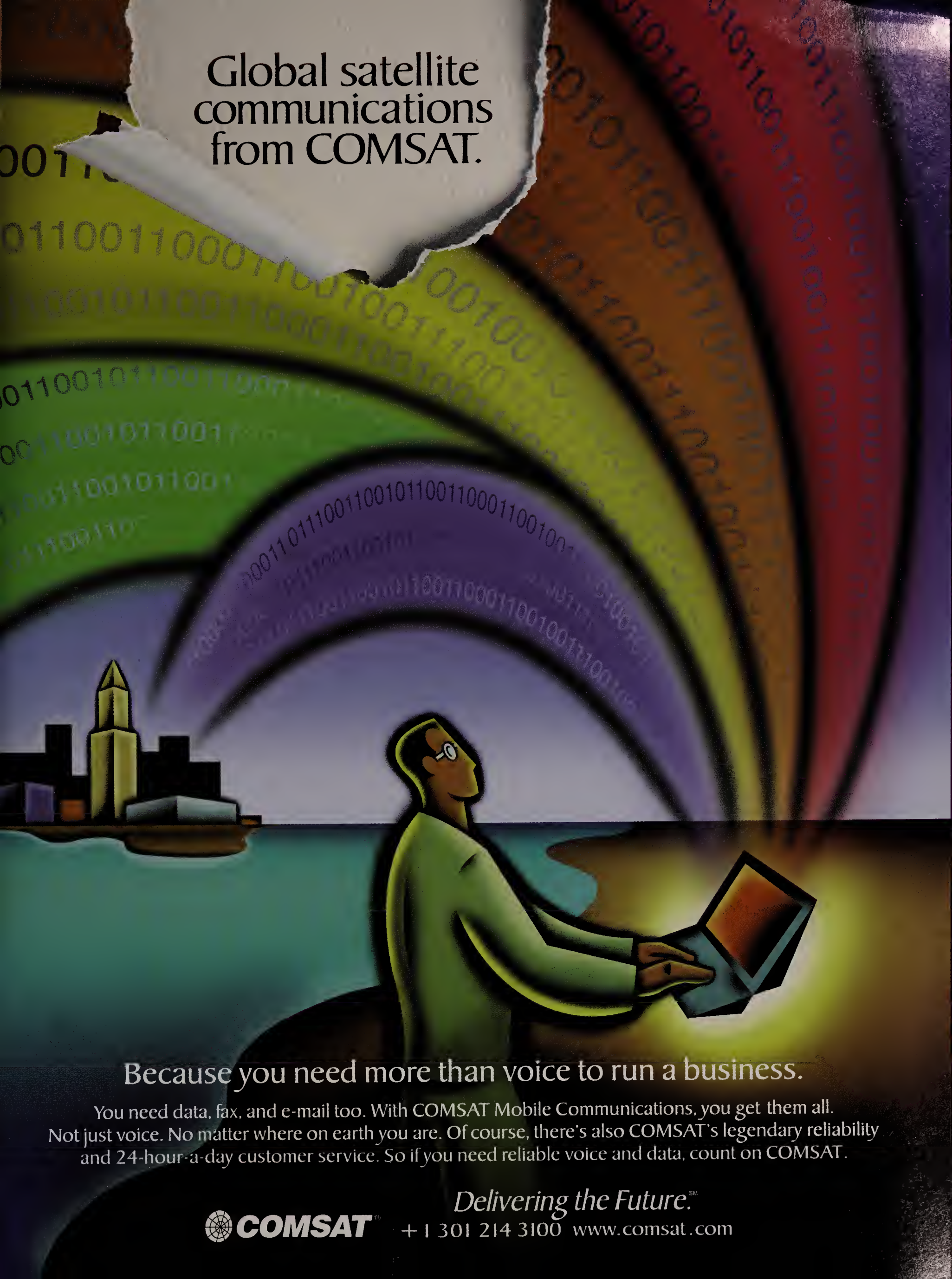
requirements and employee availability and creates work schedules within a few seconds. Call center supervisors now run staffing and scheduling models daily to compare projected conditions with actual conditions, making any necessary adjustments quickly. They also use PrimeTime to predict staffing needs to determine how performance will be affected if, for example, seven employees call in sick the following Tuesday. "Our supervisors are ecstatic to have a system

that now automatically does 'what-if' scenarios and plans schedules with a minimum of effort and time," says Reynolds. PrimeTime now runs on Pentium-based PCs, but the company will move to a LAN version later this year.

Since rolling out PrimeTime in November 1998, the company has seen an average daily improvement in service levels of between 4 percent and 8 percent and has moved closer to reaching its goal of answering 85 percent of calls within 30 seconds. Service levels during "spike" periods, when call volume suddenly soars, have smoothed out because supervisors can more accurately predict call volume. Supervisors now have more time to work with employees to ensure happy customers. And the company has achieved all of this without increasing staffing.

Reynolds says Airborne Express is working with Blue Pumpkin on its next release of the PrimeTime software, which will be able to handle additional factors, such as work rules specified by union contracts. Eventually Airborne Express hopes to create one virtual call center that manages all its daily calls. **CIO**

Louise Fickel, a freelance writer based in Yellow Springs, Ohio, can be reached at RiceKid@ix.netcom.com. Send Working Smart ideas to Features Editor Meg Mitchell at mmitchell@cio.com.



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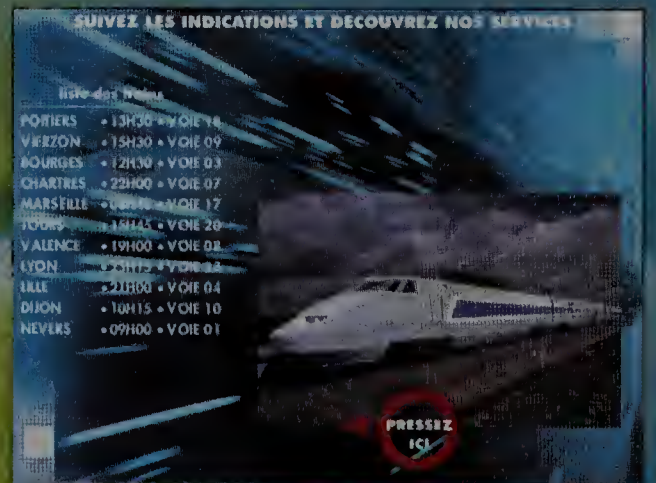
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